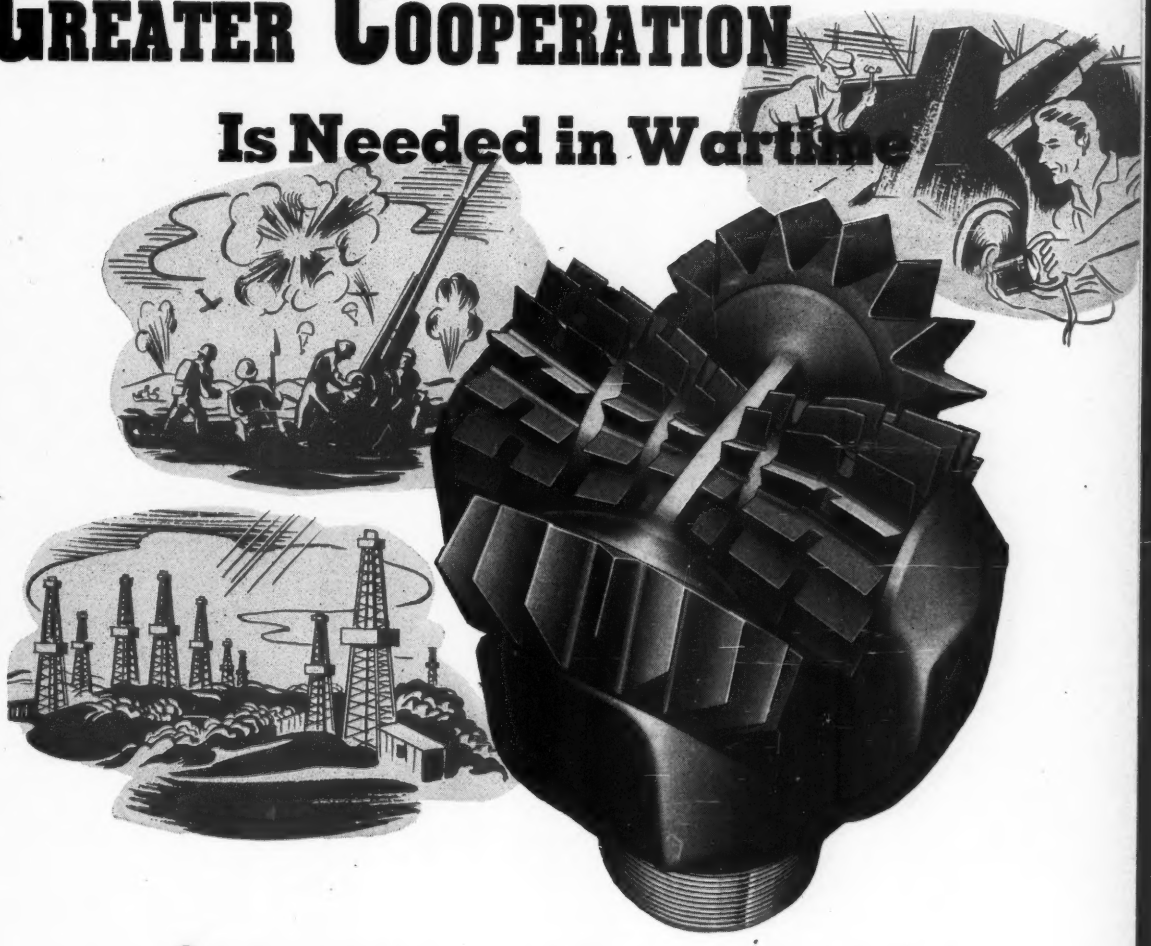
APR 19 1944

CALIFORNIA
OIL WORLD

GREATER COOPERATION
Is Needed in Wartime



ON THE BATTLE ZONE . . . at the production front . . . in the oilfields . . . whole-hearted cooperation, based on an appreciation of existing difficulties, hastens the day of victory.

Here at Crum-Brainard, in addition to maintaining our production schedule on war materiel, we are doing our level best to maintain quality and to meet shipping and delivery dates on our oil well drilling bits. Because of existing emergency regulations it is often necessary to substitute materials; and in order to bring out the best possible qualities from the steel with which we have to work, we are giving extra care to laboratory control, heat-treating, and all phases of manufacturing. Naturally these processes require more time, but we are sure our customers appreciate this and will cooperate by anticipating their requirements far enough in advance so that materials may be made up and deliveries can be made in ample time to cause no delay in their operations.

Crum Brainard

217 MAGNOLIA AVENUE • WHITTIER, CALIFORNIA

BRANCH WAREHOUSES

PETROLEUM SERVICE CO., SANTA MARIA, CALIF. • VALLEY WAREHOUSE, BAKERSFIELD, CALIF. • B & G SERVICE CO., AVENAL, CALIF.

There is No Substitute for Experience

EVEN with expert instruction, it is only by actually pitching that a youngster can gain the experience and knowledge to appreciate the top performance of big leaguers. Only by the same method—*actual use*—can you learn to appreciate the "big league" performance of Hycar synthetic rubbers—performance you want in resilient materials.

Hycar is a superior synthetic rubber—completely resistant to petroleum products of all kinds, with an operating range from −65° to +250° F. and an abrasion resistance 50% greater than natural rubber. Unlike many other resilient materials, Hycar has a minimum tendency to cold flow after taking the initial deformation, even at elevated temperatures. Further, it can be tailored to fit the job because oil-swell can be very closely controlled.

You need these qualities for oil and gasoline hose, gaskets, seals, packing, pipeline scrapers, protectors, vibration dampeners, diaphragms, valves and all other resilient products used in the oil industry.

Learn by actual experience by asking your supplier to furnish experimental parts made from Hycar for tests in your own applications. The War Production Board now permits us to furnish him limited quantities without allocation for experimental and development work. Gain the experience now that will enable you to reduce operating costs. *Hycar Chemical Company, Akron 8, Ohio.*

Hycar

Reg. U. S. P.t. Off.

LARGEST PRIVATE PRODUCER OF BUTADIENE TYPE

Synthetic Rubber

CALIFORNIA
OIL WORLD
PUBLISHED TWICE A MONTH
FOR TIMELY, COMPLETE
CALIFORNIA OIL NEWS COVERAGE • FIRST ISSUE
APRIL, 1944
VOL. 37 • NO. 7
WHOLE NO. 1654

PETROLEUM PUBLISHERS, INC.
MEMBER AUDIT BUREAU OF CIRCULATIONS
W. C. MONROE—President and Editor
V. W. HEINZERLING—Manager News Service
117 WEST 9TH STREET
LOS ANGELES 15, CALIFORNIA
KINZIE MILLER—Vice President

California Oil World and Petroleum Industry is published twice a month at 117 West 9th St., Los Angeles 15, California. Entered as Second-Class Matter January 16, 1937, at the post office at Los Angeles, California, under the Act of March 3, 1879. Subscription price $1 per year in U. S. and Possessions, $2 in foreign countries, including Canada. Member of the Audit Bureau of Circulations.

April 14th, 1944
Telephone Number TUcker 2571

API Coast District Elects Officers

W. L. Jarvis of The Texas Company, Los Angeles, was elected chairman of the American Petroleum Institute's Pacific Coast District, Division of Production, at the election held during the annual Spring Meeting in Los Angeles on March 23.

Paul Andrews, Signal Oil and Gas Company, was elected vice-chairman, Los Angeles Basin district; George O. Suman, Tide Water Associated Oil Company, was named vice-chairman, San Joaquin Valley district; and Karl Kreiger, Richfield Oil Corporation, was elected vice-chairman for the Coastal district.

W. G. Corey and D. S. Kilgour were re-elected treasurer and secretary, respectively.

Chairman-elect Jarvis is a graduate of the University of California. After two years with Barnsdall Oil Company as geological draftsman, he joined The Texas Company in 1928 as scout, with headquarters in Santa Barbara, later becoming chief scout, with headquarters in Los Angeles. He remained in this position until the Fall of 1938 when he was transferred to the engineering office. Currently he is development engineer. He has been active for many years in A.P.I. Production Division committee work.

Members of the advisory committee for the Pacific Coast District of the A.P.I., also elected at the Spring Meeting are:

Carlton Beal, chairman; L. L. Aubert, A. H. Bell, L. A. Cranson, L. C. Decius, J. F. Dodge, E. G. Gaylord, E. B. Hall, R. P. Huggins, W. L. Jarvis (ex-officio), B. P. Kantzer, Wm. Keck, Jr., W. N. Lacey, E. W. Masters, E. H. McCollough, R. D. Montgomery, R. C. Patterson, E. W. Parks, E. E. Pyles, B. H. Robinson, J. B. Sutherland, C. P. Watson, W. C. Whaley, D. K. Weaver, and J. T. Wood, Jr.

W. L. Jarvis

Parsons Heads PAW Materials Division

Appointment of Claude P. Parsons, as director of the Petroleum Administration for War's Division of materials, has been announced by Acting Petroleum Administrator Ralph K. Davies.

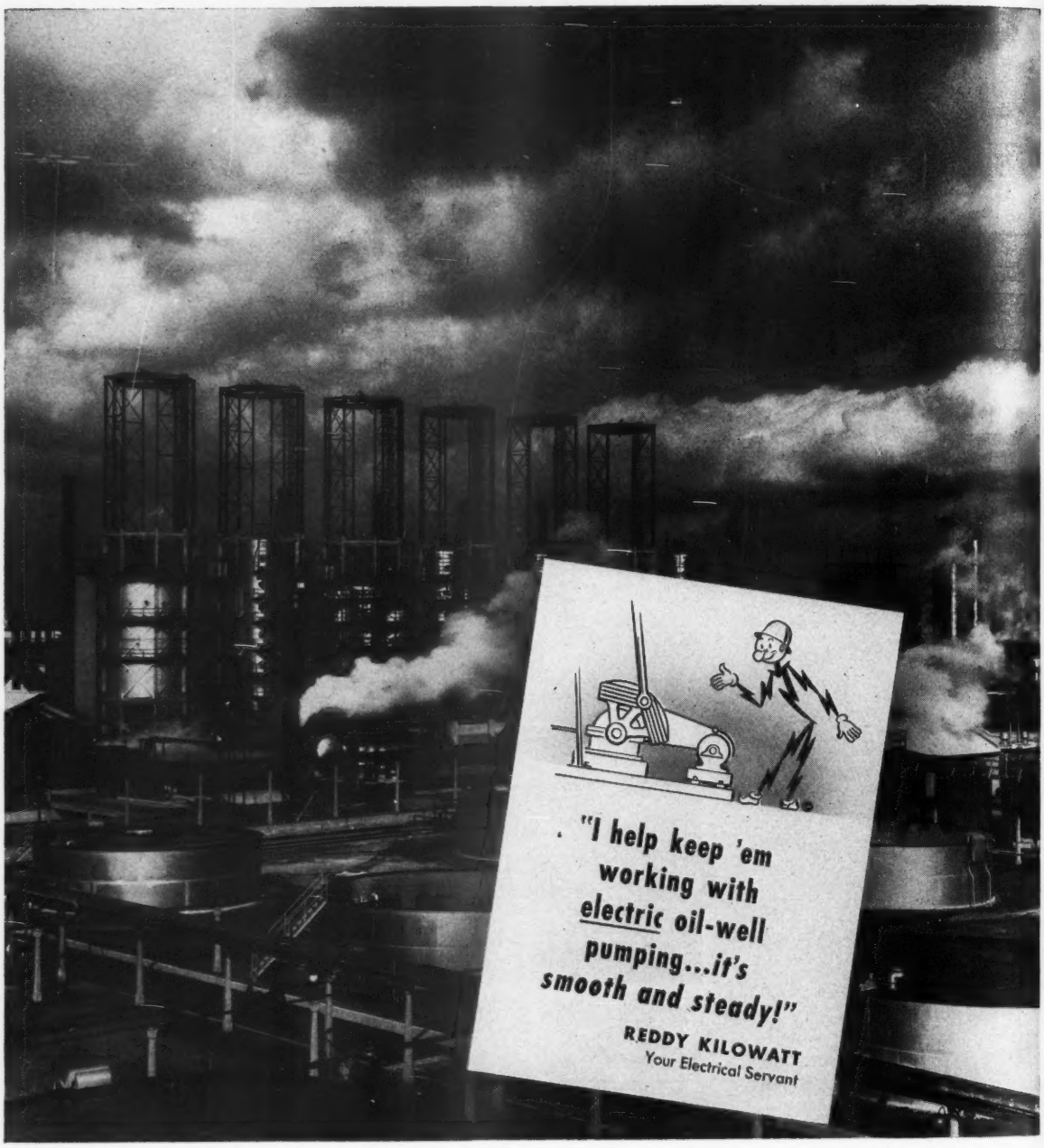
The new director fills the vacancy created by the resignation of Frank A. Watts, who returned to the Humble Oil and Refining Company of Houston, Texas, as general purchasing agent.

Mr. Parsons has been with PAW in the capacity of assistant director of the Materials Division since January, 1944. He is on leave from the Halliburton Oil Well Cementing Company of which he is vice president. His knowledge of petroleum industry materials is based upon 25 years' experience working with operating materials, equipment and methods.

Mr. Parsons was first attracted to the oil industry in the last war while serving as a lieutenant and chief test pilot in the U. S. Air Forces at Love Field, Dallas, Tex. He joined the Magnolia Petroleum Company, Dallas, Texas, in 1919, beginning as a roustabout and working up to the post of district superintendent for Magnolia in Oklahoma.

In 1929, Mr .Parsons, a native of Brooklyn, N. Y., became associated with the Halliburton Company as a field engineer. He also became chief field engineer in 1929, then manager of sales in 1932, and vice president in 1934.

Among the numerous petroleum associations with which he is affiliated are the American Association of Petroleum Geologists, the American Institute of Mining and Metallurgical Engineers, a member of the Drilling Practice Committee of American Petroleum Institute, and the Rotary Drilling Practice Committee of the American Association of Oil Well Drilling Contractors.



Richfield Refinery, Watson, Calif.

An electric motor is a smooth, constant source of power. Because electrically powered oil pumping equipment operates evenly and steadily, there is less wear on machinery, fewer repairs and replacements. The result is an important saving of maintenance time, manpower and materials.

Oil pumping machinery can be operated electrically with greater efficiency and fewer shut-downs. An electric motor is always dependable under all conditions. It will start at the touch of a button, or it will operate automatically. It requires a minimum of attention to stay in top condition.

An Edison oil field engineer will be glad to give you, upon request, all facts about electric pumping.

Reddy Kilowatt says: "CONSERVATION OF ELECTRICITY WILL HELP WIN THE WAR

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

Carrington King

Reports From Washington

Comparative peace descended upon the Washington oil scene at the end of March, as Senate and House knocked off for an Easter recess extending to April 12.

Many events of prime importance to the industry were left dangling in mid-air. While there is a slender possibility some action may be taken by Economic Stabilization Director Fred M. Vinson on the stripper well subsidy program proposed by the Office of Price Administration, most signs point to a dull fortnight for the Capital oil scribes.

Consideration of an amendment to the Emergency Price Control Act which would have affected crude oil prices was postponed when the Senate Banking and Currency Committee put over its hearings on the act until after the Easter holidays. The amendment was to be offered by the Independent Petroleum Association of America on April 3.

The sweeping investigation of the Saudi Arabia Government-constructed pipeline proposal by the special 11-man Senate Committee, headed by Sen. Francis Maloney, of Connecticut, also was shelved temporarily.

The one-day show staged by the House Public Lands Committee—to give Rep. Jerry Voorhis, of San Dimas, a final opportunity to denounce the unit operations contract which Standard Oil Co. of California and the Navy Department are hoping to consummate — provided the liveliest oil entertainment of the past two weeks.

Accusing Standard of having dominated "through the years" the price and marketing of crude oil in California, Voorhis urged condemnation of the company's holdings in the Navy's Elk Hills reserve and reiterated his opposition to a price increase, or anything that would benefit the so-called major companies.

When he appeared before the committee armed with a prepared statement, the young Californian was given several uncomfortable moments by Rep. Frank A. Barrett, of Wyoming, who revealed an unusual understanding of the Elk Hills matter.

After leading Voorhis into a discussion of the Interior Department's policy of unit development of fields in the public domain, Barrett told the Californian he wanted to talk about the subject of unit operation "because I see you haven't made a study of the one thing that is of tremendous importance to this committee."

In answer to Barrett's question whether he had "made any inquiry" into the method of operation under the unit plan, as carried out by the Department of Interior, Voorhis replied as follows:

"Well, I have made some. I know of instances, for example, where wells belonging to small operators have been shut down to the point where those wells were wrecked and were never any good any more, and to the point where the oil that would apparently have accrued to these small owners was pumped through other wells, and that was allowed to continue to the detriment of those owners. You have got me into a field where I ought to be an expert on oil matters—which I said in the beginning I was not. All I came in here for was to discuss the broad public policy."

"You came in to promote one policy as against another," Barrett observed.

"That is right," Voorhis admitted. ". . . I am asking you about unitization," said Barrett. "I don't propose to tell you that I am an expert, either, although I have had some experience with that plan, and I have come to the conclusion, after a good many years of study, that the Department of Interior, in its policy of unitization, has a wise one. And I want to call your attention to the fact that you are wholly in error when you say that one company owning little acreage was adversely affected because of the unit plan, because when that little company goes into the unit, its interests are established by the engineers, and my observation has been that the engineers have very little difficulty in distributing the exact amount that is coming to this company and the exact amount that is coming to another company owning contiguous land in the same structure."

Voorhis' views on a price increase for crude oil — which he vigorously opposes — also were brought out at the hearing, under repeated questioning by Barrett and Rep. Alfred J. Elliott, of Tulare.

Voorhis voted against the Disney bill, he said, because it "seemed to me the straightforward way to handle that matter was to give the stripper operator, the oil explorer and the small, high-cost operator, a higher return on his operations in precisely the way Vinson recommended to Congress over a year ago."

Eighty-five percent of the industry does not need an increase in crude prices, Voorhis said—adding that "I didn't just pull that one out of my own head, either; it came from some pretty careful computations." The other 15 percent should have a higher return, he said.

At this point, Barrett told Voorhis he was "mistaken . . . and inconsistent on your position on the matter." The low price of crude oil existing today does not injure the large companies to any marked degree, he noted, but has a "tremendously detrimental effect" on the small operators. . . . Voorhis finally admitted Barrett was right and

added that "the reason I voted against the Disney bill was it was darned hard to judge how to vote when it was 50-50 on either side."

The Californian seemed uncertain on the question of just how the Elk Hills field should be operated—except to urge condemnation proceedings. But if the property were condemned, he "would not necessarily be in favor of shutting in the reserve."

Elliott, who opposes condemnation because of the effect it would have on his tax-paying constituents in Kern County, got Voorhis to admit the county would be injured and treated unfairly if the Elk Hills lands were condemned.

". . . You talk about the little fellow," Elliott said. "How about the people in Kern County, when the Federal government takes this land off the tax rolls and shifts the burden to the little home owners?"

"I don't think it ought to do that," Voorhis acknowledged.

The big, raw-boned Tulare member, who has carried the ball for consummation of the Navy-Standard contract during most of the protracted Public Lands Committee hearing, reminded Voorhis that condemnation of Elk Hills undoubtedly would result in condemnation of the North and South Coles Levees. . . . Holdings of Richfield Oil Co. "eventually" would be taken over as well, he predicted.

The two best laughs of the day were contributed by Elliott, during his tireless efforts to out argue Voorhis. During their duscussion of the effect condemnation would have on the Kern County taxpayers, Elliott asked his colleague:

"Under the same conditions would you be in favor of the Government coming into your Congressional District and purchasing the majority of your orange groves so as to have sufficient juice at a later date?"

"I don't think that is a comparable situation," Voorhis said.

"It is the very same thing," Elliott insisted. "One is oil; one is orange juice. That is the only difference."

The second laugh came after Voorhis had plaintively remarked, "I just don't see why the Navy does not want to condemn and purchase Elk Hills," and Elliott had replied that perhaps it was because "they haven't got the feeling against Standard Oil that you have."

"I will say to the gentleman that I even own a little stock in Standard Oil—not very much, but a little bit," Voorhis said with a smile.

What can California hope for out of the newest move for Government development of a synthetic fuels industry, through the construction of demonstration plants to produce liquid fuels from coal, oil shale, agricultural and forestry products?

The O'Mahoney bill, authorizing the expenditure of $30,000,000 for the "five-year program" of such experimentation, has been sent to the White House for the President's signature.

This project is largely the "baby" of the U. S. Geological Survey and the Bureau of Mines—the Government's most patient and least-publicized experimenters. . . . Their scientists do not like to be quoted, so we can only jot down the answers to a few random questions asked here and there.

Oil shale is the most likely source for synthetic oil production, and there is no "true" oil shale in California—as far as is known. Scientists have been doing considerable work on saturated soils in the state, however—and it is believed the bituminous sands of California may "play a part" in the coming program.

Sand saturated with oil is found in the Kern County region and the Bakersfield region; at Casmalia, Edna and McKittrick. . . . And it must not be forgotten that one of the principal retorts to be used in the distillation of oil shales primarily was designed for work on bituminous sands.

Extraction of oil from shale is by no means a new development. Dr. David White—then chief geologist of the U. S. Geological Survey—stated, in 1919, that the deposits of oil shale in Colorado, Utah and southwestern Wyoming were "among the largest, if not the largest" deposits in the world.

From 15 to 120 gallons of oil can be expected from each ton of shale. Most of the oil extracted from shale will be used for fuel oil, as it is "not very good" for other purposes.

Here's how the States stack up on potential "oil reserves" from shale deposits: Colorado leads with an 80,000,000,000 (billion) barrel potential reserve. Utah is next, with 48,000,000,000 barrels. Kentucky is third, with 11,000,000,000 barrels; Indiana fourth, with 7,000,000,000 barrels. Wyoming is a mere 3,000,000,000 barrels, and Nevada trails with 6,000,000 (million) barrels.

. . . This sounds like a lot of oil, but it does not include the "recoverable" estimate—which is placed at approximately half of the above-named potential reserves. . . . However, the oil shales "recoverable" amounts to more than 70,000,000,000 barrels.

These figures do not take into account the abundant bituminous sands of California.

. . . Strangely enough, the most efficient work on producing synthetic oils from shale has been done in Scotland. Oil shales also have been found and mined in Australia, New South Wales, France, England, Serbia, Canada, Tasmania, the old Austria-Hungary, Turkey, Brazil, Italy and Spain. . . .

Whether or not California can climb on the synthetic fuels bandwagon remains to be seen. At all events, two foremost companies—Union Oil and Standard of California are said to be definitely "interested."

Some additional data on the $30,000,000 O'Mahoney bill: The program will be directed by Secretary of Interior Ickes, through the Bureau of Mines and Mining. Research on agricultural and forestry products will be done, appropriately, by the Department of Agriculture.

Cost studies are provided for in the bill. Authority to acquire land, equipment, services, etc., necessary to the program is given to Ickes—but Congress did not delegate power to acquire land by condemnation.

Ickes is authorized to cooperate with Federal, State, and local Government agencies; educational in-

stitutions, private individuals and firms, in carrying out the program.

There is a provision in the bill for the issuance—under license—of patents and patent rights, inventions, processes or other discoveries, made under the program or acquired outright, to private industry. Patent agreements between the Government and private industry, however, will not be made public.

While the O'Mahoney bill (sponsored in the House by Rep. Jennings Randolph of West Virginia) authorizes the appropriation of $30,000,000 for the construction of pilot plants and "semiworks" plants, and other steps toward the building-up of a synthetic oil industry, the project cannot be initiated until a specific Congressional appropriation has been made.

The honeymoon of the Petroleum Administration for War and the Petroleum Industry War Council (meaning, mostly, the oil industry or its principal mouthpiece—the American Petroleum Institute) is said to be about over. . . . It's been an unusually long honeymoon, anyhow—lasting since the day after Pearl Harbor until now, or nearly 2½ years . . . With the PIWC now convening in Washington, a "rift in the lute" is expected at any moment.

Despite the temporary halt in the move to push through the Middle Eastern pipeline proposed by Ickes' Petroleum Reserves Corp., the tug-of-war between Government and Industry over the project has not slackened.

The special 11-man Senate committee will not meet for its investigation of the international oil situation until after the Easter holidays, but the PIWC and other industry groups can be expected to make hay while the sun shines and work through the Congressional recess to trip up the pipeline proposal and put PRC out of business—if possible.

Here's the foreword on the analysis made recently by the PIWC of the "effect of the proposed Saudi Arabian pipe line":

"This planned action of Petroleum Reserves Corp., is the beginning of a fatal and mistaken policy—as grave as the fatally mistaken policy of scrapping much of our fleet voluntarily at the end of the last war.

"If permitted, it will be a fatal surrender.

"It will be a mistaken policy no less portentious than the scrapping of the fleet, because it is the scrapping of the internal strength of America itself."

. . . The War Department and the Navy Department are equally insistent that construction of the pipeline is urgently needed. Secretary of the Navy Knox, having asked for action on the project as a war and post-war necessity, the Secretary of War came out a few days ago with a defense of PRC as "a proper instrumentality of the Government to accomplish the purposes set out in its charter." In a letter to Sen. Burton K. Wheeler, chairman of the Senate Interstate Commerce Committee, Secretary Stimson stated the War Department was opposed to the resolution seeking liquidation of PRC.

Stabilization Director Vinson remains coy about that subsidy "suggestion" for stripper well operators. Officials (who should know) say details of the subsidy program may be announced "in advance" of the real bad news—in order to get the "reaction of operators." (They explain that by "operators" they do NOT mean the PIWC, the PAW, the IPPA, or others whose views already have been expressed on the subject). . . . Approval of the Office of Economic Stabilization is a foregone conclusion for whatever subsidy program the Office of Price Administration may offer.

(. . . Latest rumor—culled from one of the nation's most widely-read news columnists—says that OPA has suggested to Vinson subsidies between 25 and 75 cents per barrel for all low-producing wells. . . . This to subsidize about 80 percent of the Nation's wells and cost the Government about $60,000,000 per year.

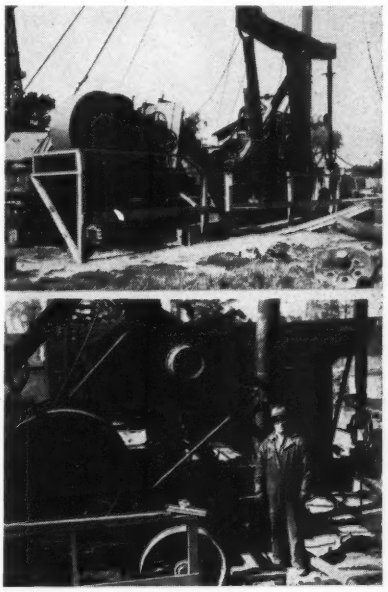
(The independents are said to have "secretly" worked out this plan—with the big companies "raising such a howl that the little follows backed out." The columnist predicted, however, the plan would go through — with Pennsylvania wells, "which are the deepest," getting the highest subsidy.

Meanwhile, prominent independents fighting the subsidy program beg to point out that the bonus offered stripper well operators will "not be tax exempt"!

We'd like to talk about some important changes in PAW personnel, but space does not permit. . . . Maybe we can explain, in the next issue, about the resignation of Holley Poe and Mort Kline from PRC; the switch-over of Gordon Sessions, from top PAW press relations man to the same spot with PRC, and (maybe) the appointment of some new and interesting figures to both staffs.

"Late Wired Bulletin"

Developments on stripper well subsidy program are expected momentarily, following conference between Vinson, Ickes, Davies and Knowlton. While no announcement has yet been made, it is reported Vinson will offer operators an additional 5 cent per barrel.



O. R. Dobson, driller for Asphalt Development Co., is cleaning out an old Huntington Beach Tar Zone well with the intention to re-establish production. The No. 56 Star cable tool rig should bring back memories to the oldtimers of California drilling. Some modernization will be seen in the upper view.

Men have to eat

At Valley Forge, that winter of 1777-78, the trouble was hunger. Winter was hunger's ally. Yet, to Washington's men, winter was a familiar enemy. With full stomachs they could have scorned the cold. But, for food, they had only what could be found within the few miles their wagons could break through drifts.

Today the Army's "forage wagons" cover incredible distances — sometimes flying, sometimes swimming, sometimes riding the rails. To the soldier in Italy they carry fish from Alaska. To the fighting man in New Guinea, they take vegetables from California, fruits from the Northwest, meats from the wide ranges of the West. Valley Forge would be a breeze.

Many things make this possible. But to that achievement the canning industry has contributed most. From the newest cannery girl preparing tomatoes to the scientist who has captured the vital vitamin, this industry's thousands have, together, made sure that our Army travels on a *full* stomach.

Besides making food everywhere transportable, the canning industry has vastly increased everybody's food supply — particularly in the West. Many a flourishing orchard would not exist if the Bartlett pear could not be canned. But for its cannery, many a farm district would be wasteland. And don't forget how many cowboys ride the beef-producing range, fortified by the canned bean.

Everybody knows that, wherever they may be, men must eat. Everybody knows, actually, what the canning people have done about it. Everybody is thankful that whether in tropic heat or arctic cold — our boys will never again face a Valley Forge. We mention it solely because —when you're in there pitching as canning people are — it's nice to know that others appreciate it.

STANDARD OF CALIFORNIA

Quality-Service STANDARD

E flag, with 2 stars, awarded to our Richmond Refinery

Controlled Water Flood Development and Operations in Mid-Continent

ABSTRACT

This paper reviews development operations and control in use on a shallow 700 feet flood in Eastern Kansas. In all more than 200 flood acres are represented, part of which was developed with little engineering data and control while in the latter part of development considerable detailed engineering has been utilized. Development and operating methods used are described and a comparison is made between the oil recoveries obtained to date on three adjoining leases. Comparisons are also made for anticipated ultimate oil recovery of the three showing the anticipated gain expected by use of improved methods. Mention is also made of progress toward deeper flooding where operations are being carried on with a sand depth of 2000 feet.

By C. EARLOUGHER,
Consulting Engineer,
Geologic Standards Company
Tulsa, Oklahoma.

The purpose of this paper is to report on certain water flooding operations now in progress on a group of leases in Eastern Kansas. The literature contains many articles on water flooding; however, a large number of these deal either in generalities or with certain technical or theoretical phases of secondary recovery. The main subject of this paper, on the other hand, is limited to one successful operation in the hopes that the factual data may be of benefit as a guide to new operations in other areas. Admittedly methods that proved successful in one local area may not be adaptable to all other areas; on the other hand, basis principles are generally the same.

The particular water flooding operation covered by this paper was chosen for two specific reasons, the first that the operations are successful, and the second, that a large amount of detailed data is available for the operations. In addition to these prime factors this project is of interest because of the changes and advancements that have taken place as a result of experience gained in the field. Release of this data has been made possible by the cooperation of Mr. H. J. Walter, Independent Oil Operator of Bradford, Pennsylvania, a partner in the company of Lynde, Walter and Darby; Manager of Operations, Mr. D. P. Oak, and Field Superintendent, Mr. J. O. Couch.

Location

Lynde, Walter and Darby's flooding operations are located in Neosho County, Kansas, just east of the Town of Chanute. Flooding operations to date have been carried on in Sections 22 and 15, Township 27 South Range 18 East.

Producing Formation

The producing formation is Bartlesville Sand occurring at a depth of approximately 700 feet. The sand is a typical Eastern Kansas shoestring varying in width from 1,000 to 2,500 feet and extending several miles in length. The sand grains are composed for the most part of quartz with the cementing material carrying considerable quantities of shale. The sand section rarely occurs as a solid sand body but instead contains numerous shale laminations and shale breaks varying in thickness from less than one inch to several feet. In general these shale breaks can not be correlated from well to well. The thickest sand section generally follows the center of the productive trend and the sand thins out on both sides into shale. The pay section of the oil sand is dark chocolate brown in color. In some locations the sand grades from chocolate brown to dark blue or black at the bottom of the sand formation. The dark color of the sand at the bottom is apparently due to heavy asphaltic oil and experience has indicated that little oil recovery can be obtained from this section.

In this particular area the sand trend runs from southwest to northeast. Fig. 1 is a map showing the three leases, namely "A", "B", and "C" with which this discussion is concerned. The thickness of the sand section varies from 55 feet in the center of the trend to 10 or 15 feet near the edges. In some local areas the upper part of the section is a depleted gas sand. Net oil sand varies in thickness from a maximum of approximately 40 feet to a minimum of about 8 feet. Driller's logs for Leases "A" and "B" indicate average sand thickness of 39 and 38 feet however, subsequent coring on Leace "C" indicates that the actual oil sand is probably nearer 31 and 30 feet for the first two leases drilled.

Past History

These leases were originally drilled in about 1905 and after that were redrilled two different times before water flooding operations were commenced late in 1937. The early productive history is very sketchy and no records are available as to quantity of primary oil produced from the properties; however, old-timers in the local area have estimated that the best properties probably produced little more than 4,000 barrels per acre with recoveries varying from less than 2,000 to 4,000 barrels per acre.

Water Flooding Development

Before operations were commenced for secondary development two rotary cores of the sand were secured. The first was located on the north line of Lease "A" and the second near the southeast corner of Lease "E". Both of these cores showed a good net sand thickness together with good oil saturation and permeability considered favorable for flooding. Following this, development was started late in 1937 on Lease "A" and has been continued northward through Lease "E". Leases "A" and "B" were developed with little additional coring between the end of 1937 and the middle of 1941. When development was commenced on Lease "C", the policy of coring every well drilled was begun.

Because of the poor condition of old wells on the leases new drilling was employed from the start. A few

PACIFIC BANDWHEEL DRIVES

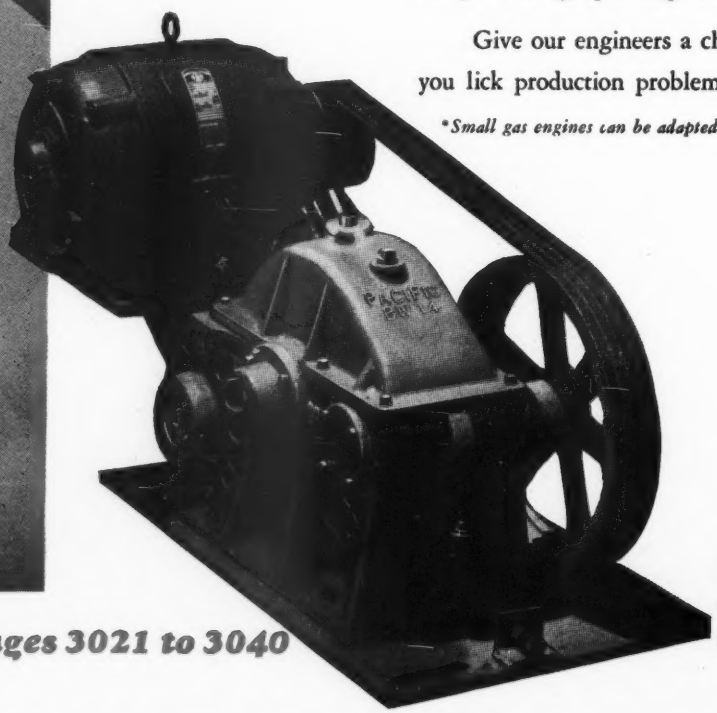
If you are having trouble getting delivery on complete portable oil well pumping units for your newly drilled wells, here is one way you can overcome delays and perhaps step up existing production.

Pacific-Western manufactures a highly efficient band-wheel drive consisting of integral (*) power unit, multiple V-belt drive, gear reducer case and chain and sprocket drive to band-wheel shaft. This band-wheel drive unit, together with existing equipment you may have around the yards, can be adapted to your present producing wells. Oil well pumping units on these wells may then be shifted to new holes.

The band-wheel drive unit, by reason of its low power consumption and slower pumping speed, is increasing output on many older wells and at the same time materially reducing operating costs.

Give our engineers a chance to help you lick production problems.

**Small gas engines can be adapted.*



See our catalog, pages 3021 to 3040

1944 Composite Catalog

Commercial Offices:—11181 Long Beach Blvd., Lynwood, Calif.

WESTERN GEAR WORKS

PLANTS: SEATTLE, LYNWOOD, VERNON, SAN FRANCISCO

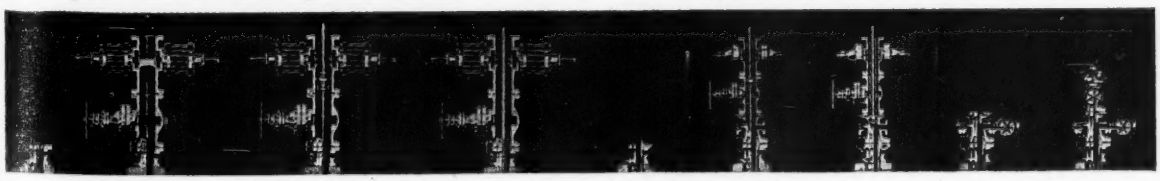
THE WHOLE IS GREATER THAN ANY OF ITS PARTS

ONCE THE *"drilling in" operation has been performed and the unquenchable force of nature in the form of pressure has been released from the earth, it is then ever present throughout all of the succeeding operations of building the well.*

★ **Gray Systems of Well Control anticipate the problem of pressure by providing the necessary equipment to control pressure before the "drilling in" operation, a planned operation that is the difference between having heterogeneous parts and fittings, and a coordinated system of well control. This method has been proven in more than 11,000 successful completions.**

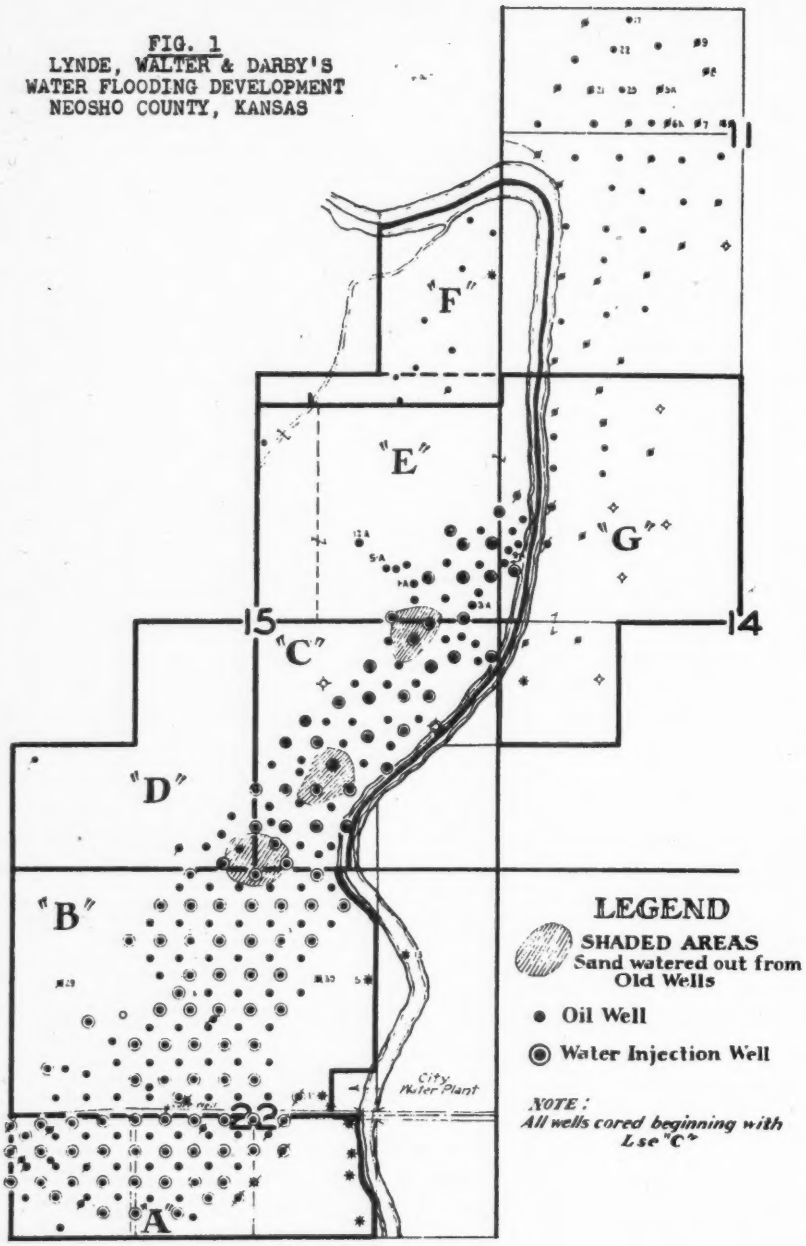
GRAY
TOOL COMPANY
HOUSTON

West Coast Distributor: WAGNER-MOREHOUSE, INC., Los Angeles. *Export Representative:* GUY E. DANIELS, 30 Rockefeller Plaza, New York City



Casing Head Attached | Drilling | Running Casing | Casing Landed | Drilling Control Equipment Removed | Drilling-in and Running Tubing | Tubing Landed | Control Equipment Removed | Manifold Attached

FIG. 1
LYNDE, WALTER & DARBY'S
WATER FLOODING DEVELOPMENT
NEOSHO COUNTY, KANSAS



of the old wells still pumping were cleaned out, equipped with new tubing, working barrel and rods and kept on the pump, but at the same time new oil wells were drilled for all of the "five-spots". The rest of the old wells together with all abandoned and plugged holes, the location of which could be determined, were cleaned out as near to bottom as possible and then plugged with cement. These plugging operations were expensive but unavoidable. In many cases the presence of old holes was not apparent until after water injection was under way at which time applied pressure in the sand caused old holes to "break out" as evidenced by oil or water flowing from the ground. In such cases the plugging job is oftentimes more expensive than when done before the flood is in operation. On leases such as these, old holes are one of the greatest sources of trouble—not only from plugging operations but also from the harm done to the oil sand by upper formation water entering the sand and starting a natural water flood. Detailed coring on Lease "C" made it possible to determine the deleterious effect of some of these so-called "leakers".

Lease "A"

A summary of development, operating and expected ultimate oil recovery data for Leases "A", "B" and "C" is given in Table 1. The data have been compiled in this manner in order to show the comparison of conditions for the three leases.

As previously stated development on "A" was started near the end of 1937 and was completed early in 1938 including the north line of water injection wells which also form the south line of injection wells on "B". A total of 53 new wells were drilled including 27 oil wells and 26 water injection wells; however, in order to divide the line wells properly between Leases "A" and "B", Lease "A" is only charged with 22 water wells or a total of 49 new wells with 4 of the line wells being charged to "B".

A regular five-spot pattern was used with a spacing of 330 feet by 330 feet from like well to like well. With complete development it is estimated that 55 acres were being flooded. This figure includes only the acreage supposedly drained by oil wells on this lease and does not include sand outside of the water wells for which there are no oil wells or that acreage on adjoining leases. The pattern resulted in a density of one well (oil plus water) drilled for each 1.12 acres.

Oil sand was logged from cable tool cuttings and shot chosen in a like manner. Average sand section on Lease "A" was logged as 39 feet and average pay sand estimated to be 31 feet. All wells were shot with liquid nitrogylcerine. Shots for oil wells were approximately twice as heavy as those for injection wells following the rule of thumb procedure first established for the Mid-Continent Area in Northeastern Oklahoma. Oil wells were shot with an average of 1.77 quarts of glycerine per foot of sand while water wells were shot with an average of .79 quarts per foot. Later work has indicated the advisability of heavier shots, especially in the injection wells.

Operating results obtained since the first development together with recent coring show that drilling

on Lease "A" was extended too far towards each edge of the sand trend. From Fig. 1 it is to be noted that two wells on the west side of "A" and three wells drilled on the adjoining lease to the east have been abandoned. They are all wells which probably should not have been drilled and which would not have been drilled under present day methods being used by the operator.

Lease "B"

Lease "B" was drilled in a manner similar to that employed on "A" with the exception that drilling was held closer to the center of the sand trend and fewer wells were drilled along the extreme edges of the sand. Two wells were cored on this lease during development. The first was located near the center of the trend and the second along the west edge towards the north end of the lease. Later two wells along the north line were "chip cored" but the results of these were not satisfactory, probably because of the character of the sand.

Drilling on this lease was carried on in stages between the first month in 1939 and the middle of 1941. Because of the time lag between the different drilling programs some factors pertaining to "B" are difficult to evaluate fairly. At completion of development a total of 84 new wells had been drilled. Of this number 48 were oil wells and 36 were injection wells. Counting four of the line wells on the south brings the number of inputs to 40 and the total to 88. These wells represent a total of approximately 100 oil acres resulting in a total well density of 1.14 acres per well or very nearly the same as for Lease "A".

Average sand section for "B" was logged as 38 feet. The net oil pay thickness is estimated to be 30 feet. Wells were shot approximately the same as those on "A". Average shot used in the oil wells was 59 quarts of glycerine or an average of 1.97 quarts per foot. A lighter shot was used in the water wells with an average of only 25 quarts per well or 0.83 quarts per foot. Two or three different shell sizes were sometimes used in making up a shot depending on the appearance of the sand cuttings, but for the most part the entire sand section in each well was shot uniformly. Subsequent observations and tests points to the fact that in many cases the wells were not shot heavily enough. This is especially applicable to the water injection wells.

This fact is evident from the results obtained by reshooting of a "tight" input towards the northwest side of the lease. In this area nearly all of the inputs have been low takers from the time water was first turned in with an average input rate of only 5 to 10 barrels of water per day per well for 25 feet of sand. Furthermore, little affect from the flood showed in surrounding oil wells. In order to check the advantage of heavier shots the packer was drilled out of one of the wells. The well was then reshot, cleaned out and recompleted. The resulting increase in injection rate is shown in Fig. 2 together with the data for both original shot and the reshooting. Although Fig. 1 extends only to the end of 1942 the well at the end of 1943 was still taking water at the rate of 25 barrels per day. Effects of increased injection was soon noted on surounding oil wells by increased oil production. Because of expense and risk involved in going back into an input well to drill out packer no attempt was made to reshoot any more of the low takers but the use of heavier shots has been continued on new wells using core analyses as the basis for determining size shot to use.

Lease "C"

Drilling of Lease "C" was begun during the middle of 1941 and completed approximately one year later. The sand in each well drilled was cored and shooting and completion of wells was based almost entirely on the cores and laboratory analyses of them.

Many advantages have resulted from this intensive coring program. Results to date indicate that the additional expense incurred will pay dividends both in a greater ultimate oil recovery and a saving in wells drilled, completion practices, etc. An important change in development procedure on old leases such as those considered here is the order in which oil and water wells are drilled. The customary practice is to drill the input wells first and then drop back and drill the oil wells. After it was established that it was possible to determine whether or not sand was already heavily water affected or watered out because of old wells together with the fact that a producer completed in such an area seldom ever makes a good oil well the procedure was reversed. The practice now used by the operator is to first drill a line of oil wells. If the sand is found to be watered out in a particular well, the well is made into an input and one of the surounding input locations is then completed as the oil well providing, of course, the sand in it is not also watered out. An irregular pattern may result but it is believed that more oil will be producd. The development map of Lease "C" in Fig. 3 illustrates the effect this procedure had on pattern in this case. From past experience both in this particular area and also in Northeastern Oklahoma the operator has ample reason to believe that this procedure is paying dividends.

The flood unit on "C" includes 58.3 oil acres on which 48 new wells are in operation. There are 21 new oil wells and 27 inputs making a total of 48 new wells drilled. In addition two dry holes were drilled and then plugged. These wells probably would not have been considered dry had they not been cored. The cores showed they did not warrant the expense of shooting and completing.

As the new wells were first completed there were 23 oil wells and 25 inputs; however, two of the oil wells were later converted to inputs because they were located in watered sand. They were completed early in the development and before the practice of drilling oil wells before water wells had been put in use.

Average sand formation thickness is 30 feet with an average net pay of 25 feet. A well spacing of approximately 330 feet east and west and 440 feet north and south was originally planned but because of the irregularity of the trend some more closely spaced wells were drilled. This resulted in a density for total wells drilled of 1.22 acres per well. Even though this is less than originally intended it is greater than that used on "A" and "B".

All wells were shot selectively based on the core analyses. In making up a shot, consideration is given

What is Free Enterprise

A Definition by Erle P. Halliburton

THE THING which has made the United States the strongest nation in the world has been what we have called our free enterprise system. This means a free competitive society in which the individual must render as good or better service, or sell a commodity for the same or less money than anyone else is willing to offer. In other words, in a free competitive society the buyer has the privilege of buying in an open market at the lowest price offered. Under free enterprise each individual must assume the responsibility of his own economic well-being. It is this responsibility which develops character, confidence and strength in the individual citizen. No nation can ever be stronger than the collective strength of its individual citizens. It is this philosophy of government which has developed a people who are able to give themselves the highest standard of living ever enjoyed by mankind. Under a free enterprise system you have the right to work for whomever you please, at whatever salary or wage meets with your approval; you have the right not to work unless you choose; you have the right to own property or not to own property; you have the right to save your earnings and invest them in a large or small corporation, or not to invest them at all; you have the right to worship as you see fit. In short, you have the right to the pursuit of happiness.

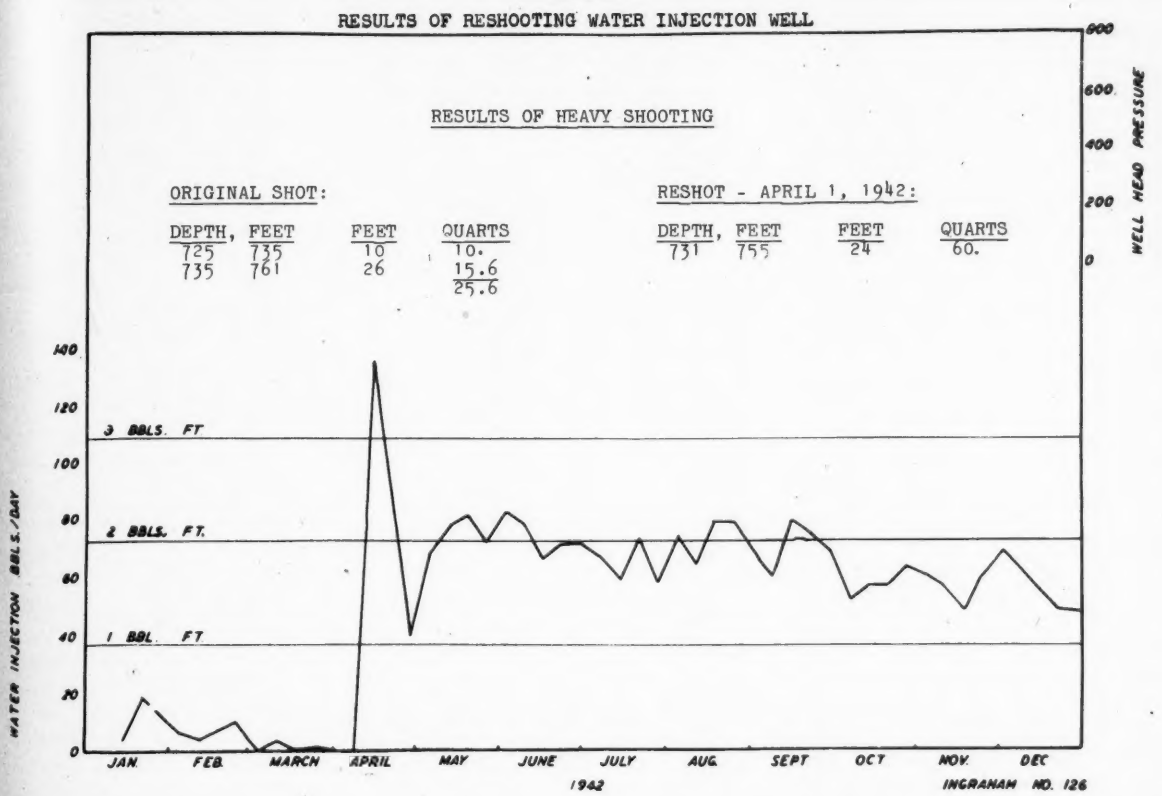
Under our competitive system the individual with special talents and a desire to accumulate property continually strives to render a greater service for less money than his competitor. It was this striving for financial gain which developed our mass production methods which have made it possible for the American workman to produce and consume three or four times as much as any workman of the most advanced nations, and ten times as much as the so-called under privileged peoples of Asia, India and China.*

Halliburton Oil Well Cementing Co.

Duncan, Oklahoma

* *Mr. Halliburton's definition is quoted from the book "The Seeds that Grow Jobs"—a story of how Halliburton creates jobs, written by Claude P. Parsons. May we send you a copy?*

FIG. 2



to oil and water saturation, laboratory flooding tests and character of the sand itself in addition to variation in permeability. This method of shooting is proving quite advantageous. It helps materially to even the flow of water into a sand section of widely varying permeability in the injection wells. It is also useful in producers in which part of the section is water affected. Water production from watered sections is kept to a minimum by using a very light shot or no shot at all opposite such a section. Shell sizes varying from 2 inches to 5 inches in diameter or 0.6 to 3.9 quarts per foot are used.

The general trend was to use heavier shots over-all on Lease "C", shooting both inputs and producers in a similar manner. Shots used on "C" averaged 2.37 quarts per foot or 57 quarts per well. One noticeable result of these heavier shots has been the fact that it has been possible to maintain a fairly good injection rate into almost all of the water wells on the lease. Also much less water was produced from the oil wells during the early life of the flood indicating that the selective shooting was beneficial. It was formerly believed necessary to keep the top of shot six or seven feet below the packer seat in order to obtain an effective shut-off; however, field experience has proved that the end effect of the shot in most cases extends only a slight distance above and effective packer settings are within two and three feet of the top of shot. Another example of the relatively small end effect are "bottle necks" encountered in some wells when cleaning out in cases where two to five foot spacers have been used in shooting. In fact because of these "bottle necks" the operator now usually runs the smallest shell possible instead of a blank so as to avoid trouble in cleaning out.

Drilling and Well Completion

Cable tool spudders are used for drilling. The usual procedure is to set 20 to 30 feet of 10 inch surface pipe and approximately 550 feet of 8 inch water string. The latter is pulled upon completion of the well. Oil wells are cased with 5 3/16 inch casing set on a 5 3/16 x 6¼ inch swedge with a 6¼ inch bottom hole nipple on bottom. Casing is cemented with 5 sacks of cement and 500 pounds of sand so that the wells can be flowed through casing during late stages of operations. Annular space is filled with spud clay to the surface. Two-inch tubing is used in both oil and injection wells. Oil wells are equipped with two-inch working barrels.

A central power, rod lines and jacks were used to pump the wells on Lease "A". The other leases have been equipped with individual electric pumping jacks equipped with time switches. The latter are preferred because of the high salvage value and the ease with which a single unit may be moved from an old well which is allowed to flow to a new well completed on later development. Inasmuch as no gas is available from the lease for power all fuel must be purchased and in the case of these operations electric power is as cheap or cheaper than gas. Initial investment using individual units is very nearly the same as for a new central power, rod lines and jacks. A saving in labor costs also follows from use of the electric jacks. The operator found that with

a central power about 50 per cent of the pumper's time was spent on maintenance of rod lines and now that time is available for other work on the lease.

In drilling of water injection wells 6¼ inch casing is used as the water string. During development of Leases "A" and "B" homemade packers consisting of a swedge nipple and two or three burlap bags were used. The packer was set using a two inch anchor on bottom. The anchor carries two four-way tees with one a few feet below the packer and the second a few feet above the bottom. It is equipped with a special seat between the tees to permit back washing of the well. For back washing a string of one inch is run inside of the two inch and seated on the special seat. Circulation is then established through the bottom tee up through the shot hole to the upper tee and thence up the annular space to the surface. Packer is cemented with 5 sacks of cement and 500 pounds of sand and annular space filled with spud clay.

Since 1941 the anchor packer has been eliminated in order to keep the shot hole free of any obstructions. The procedure now followed is to use only a swedge nipple on the bottom of tubing together with burlap bags. When tubing is run the swedge is lowered into the shot hole and then tubing is raised until the swedge and burlap "freeze" in top of shot hole. Tubing is clamped onto the casing string and cemented. After cement has set a pulling machine is used to remove the 6¼ inch casing. Injection wells completed in this manner may be backwashed much more successfully by use of a nozzle and a jetting action applied to the sand face. Each injection well is equipped with a gate valve, meter and pressure gauge connection.

In development before the middle of 1941 all casing seats and packer seats were picked in the field from cable tool cuttings. Since that time they have been selected by coring and the subsequent analyses of the sand. This procedure has made it possible among other things to pack off upper gas sand which is undesirable in water flooding operations.

Water Supply

Water for flooding is obtained from the Neosho River which furnishes an ample year round supply. The water is aerated and treated with lime and alum, chlorinated lime and copper sulfate and then filtered. Lime is added to increase the pH and reduce corrosion and alum as a floc to help remove mud and finely suspended matter from the water. Chlorinated lime and copper sulfate are used to eliminate algae. Three pressure type filters are used for filtering. Filters are backwashed about four times a day. Filtered water is stored in a 1000 barrel redwood tank. Return salt water from the lease is mixed with raw water from the river and the two treated together.

Three triplex pumps are used for supplying water to the injection wells. A pressure of 800 pounds per square inch is carried at the plant. At the present time the plant is operating at near capacity, handling 5,000 barrels per day and furnishing water to more than 100 input wells.

Core Data

Wells cored are drilled to top of the sand with cable tools. A three-inch coring string is then run and the sand section cored using a light portable rotary care drill mounted on a 1½ ton truck. A core two-inches in diameter is secured from the formation. In most cases recoveries varying from 90 to 100 per cent are obtained. Plain water is usually used to core with although water-base mud and regular lease oil have been used. Little or no flushing of oil from the cores takes place so that the cores can be used directly to evaluate oil content of the sand. Similarly there appears to be little or no drilling water contamination of the cores so that they may also be used directly to evaluate interstitial water saturation of the sand.

Cores are analyzed for oil and water saturation, porosity, permeability and floodability. Saturation samples are taken from the core as soon as it is taken from the core barrel and sealed immediately in tin cans. Duplicate samples for laboratory flooding tests are also taken and sealed in a similar manner. The flooding tests are very important and are used extensively in final interpretation of the analyses. 1 & 2/ Among other things they are used to help determine net feet of floodable sand, recoverable oil, sand already water affected, flooding rate and type of shot. For most satisfactory results correlation with actual field data is desirable. These tests are also especially helpful in differentiating between the floodable oil pay and the non-floodable black asphaltic sand at the bottom of the sand section. Samples from the black sand normally show as much as 40 to 50 per cent oil saturation but the flooding tests indicate little or no oil recovery. Non-floodability of this sand has also now been confirmed in the field.

Porosity

Porosity of the Bartlesville Sand in this area varies from 16 to 24 per cent and averages over-all about 19 per cent. There is a Stray Sand just above the main sand trend that cuts across the south part of Lease "E" and the north end of Lease "C" from northwest to southeast that is being flooded along with the main Bartlesville stringer. Porosity of this Stray averages about 23 per cent.

Permeability

Permeability of the main sand stringer ranges from a low average of 15 millidarcys to a high of 110 millidarcys for individual wells. Variation in a vertical section is in some cases as great as from impermeable to 500 millidarcys. Permeability of the Stray Sand is much higher, varying from 5 to 2,000 millidarcys with the average for individual cores ranging from 60 to 480 millidarcys. To date no serious difficulty has been encountered from these great variations in permeability even though both sands are open in some of the producers and imputs.

Oil Content and Saturation

Oil content of the oil sand varies from less than 300 to 1,000 barrels per acre foot. The lower values are found in sand that has already been flooded while the highest values are normally encountered in areas just ahead of an accidental water drive. Average values vary between 360 and 800 barrels per acre foot.

Oil saturation ranges from less than 20 per cent to nearly 60 per cent with averages between 25 and 50 per cent. Water saturation varies from less than 25 per cent to more than 60 per cent with averages falling between 30 and 55 per cent. The

critical water saturation has been determined at approximately 40 per cent, i.e. so long as the water is no higher than 40 per cent the sand does not produce water. Flooding tests indicate residual oil saturations between 17 and 28 per cent with an average value of approximately 21 per cent. Oil recovery factors of less than 20 per cent to more than 90 per cent were used in estimating flood oil recovery.

Gravity and Viscosity

Gravity of oil produced varies from 31 to 32.5 degrees A.P.I. at 60 degrees Fahrenheit. The average viscosity is about 13 centipoises at the estimated bottomhole temperature of 70 degrees Fahrenheit.

Operations

As water wells were drilled and completed on each lease water was turned in rather than waiting to turn water into all inputs of a unit at the same time. So far as can be determined this had no deleterious effects on flooding action. The only apparent disadvantage is that it sometimes is more difficult to evaluate a flood's efficiency during the early operating life. This is illustrated by the records for Lease "B" discussed later. Oil wells are also put on the pump as soon as they are drilled and pumped as strippers until affected by the flood. Water injection rates on all leases have been controlled carefully in the field. On Leases "A" and "B", however, the tendency was to keep total water per day equal for all wells while on Leace "C" the effort has been to use the same rate per foot of net sand per day for all wells. There are exceptions to this governed by local conditions but it is believed that injection volumes should be based on net feet of sand rather than on number of wells. Some injection wells are kept partially shut in at the well-head at all times in order to prevent excessive intake volumes while others are operated at full line pressure from the time water is first turned in.

Water meters are read each day so as to keep a close check on individual wells. This practice has been followed from the beginning. The idea

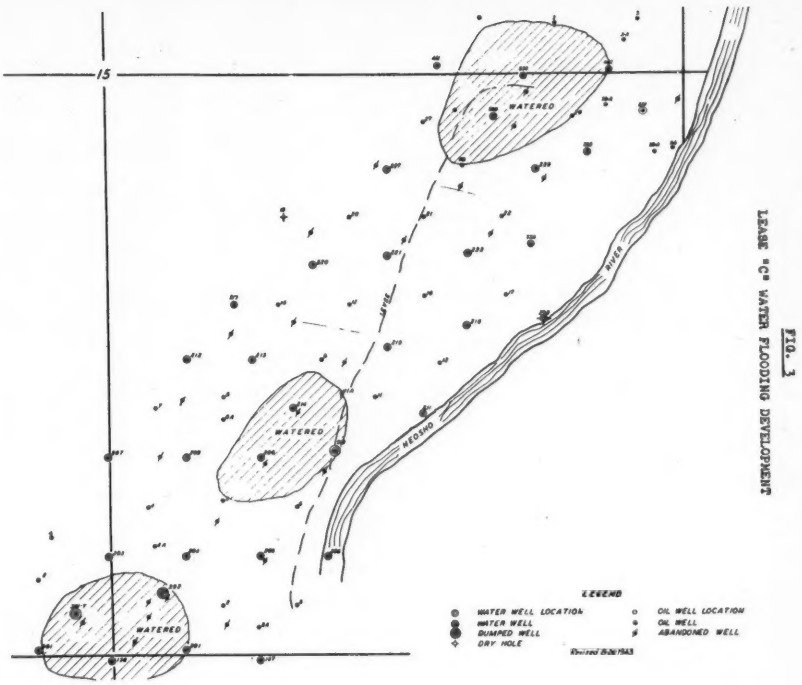


FIG. 3
LEASE "C" WATER FLOODING DEVELOPMENT

is sometimes expressed that once a well settles down to a constant injection rate daily meter readings are not necessary but experience has indicated that daily readings are useful and more than that a necessity if proper control is to be maintained. Some wells are very unpredictable. A well may go for several months with a constant intake rate under full line pressure and then for no determinable reason start taking at a rate 50 to 100 per cent greater. If the increase is not picked up at once and the well pinched in serious trouble may result.

Even though many input wells on "A" and "B" were pinched-in, well-head pressures were not gaged. This makes it impossible to check closely the individual performance of a pinched well. Unless a well was operated at full line pressure soon after water was first turned in it is not possible to estimate the volume of water used to fill the voids in the sand. Similarly no records were kept of production from individual producing wells other than occasional tank tests.

On Lease "C" pumping time has been recorded once each week and in this way a relative gage of individual well performance has been maintained. When any appreciable change occurs in any one well as noted from the pumping records a portable tank is set at the well and a physical test made. Detailed completion data has also been obtained for all wells on "C" and subsequent leases. This consists of fluid level in the hole before shot and after standing approximately thirty hours; clean out time after shot; and initial production (oil and water) after clean out determined by bailer test. Fluid level is used to approximate formulation pressure and together with core analyses to collate whether or not an iccidental flood is already acting in the area of the well. The production tests have been used to correlate results of core analyses to field conditions.

Produced water is not gaged for any of the leases because of non-availability of a satisfactory method for measuring it at reasonable cost. In some cases special meters have been tried and found unsatisfactory. All return water is drawn from the receiver at the tank battery by means of a syphon. During the early months of a new development return water can be estimated fairly accurately but later when volumes are high it is difficult to get even a close estimate inasmuch as water production is not constant during

a 24 hour period. The water usually comes from the lead lines in slugs.

Since no regular gage of produced water is available neither are produced water-oil ratios to be had. It has been found, however, that the injected-water produced-oil ratio is highly satisfactory for collating the efficiency of a water flood. In fact next to actual oil recovery the injected-water produced-oil ratio is the best index of a profitable or non-profitable operation. Since every barrel of water pumped into the ground represents a direct cost for each barrel of oil produced and since water costs average approximately one cent per barrel it is imperative that water oil ratios be held to a minimum.

Many floods in the Mid-Continent have had over-all water oil ratios in excess of 20 to 1 which means that twenty cents has been paid out for water for each barrel of oil produced. At the same time it follows that the volumes of produced water were high which in turn resulted in increased direct pumping costs. These two factors generally result in excessive operating costs and a non-profitable flood. Better floods in the same area have had over-all injected-water produced-oil ratios as low as ten to one with a resulting water cost of approximately ten cents per barrel of produced oil. At the same time produced water is down accordingly giving an appreciably lower pumping cost. As a rough guide the cumulative water oil ratio should remain below ten to one until after the initial investment has been returned for a profitable operation.

Lease "A"

Oil production on Lease "A" increased sharply three months after the first water was turned in going up to 2 barrels per day per acre. It peaked five months later at 3.4 barrels per day per acre and then started its decline. This peak was relatively low considering the average sand thickness of 31 feet.

Water injection the first two months was maintained at a rate in excess of 45 barrels per day per acre and was then decreased to a rate varying between 20 and 35 barrels per day per acre for the first three years of operation. At the end of the ninth month water injection rate started a steady decline that continued until May, 1942, at which time all pumping wells were converted to flowing wells. From that time on the average rate has been about 10 barrels per day per acre. The decrease of intake volumes resulted from the normal decline occurring in individual wells.

The average injected-water produced-oil ratio reached a minimum of 8.4 to 1 during the third month and then started upwards. The fact that the minimum occurred so soon after water was turned in indicates the probability of water channelling through the most permeable sand flooding those streaks out in relatively short time. During the last year of pumping operations the ratio varied between 18 and 26.5 to 1. When the lease was converted to flowing the ratio increased to about 37 to 1. At the time of conversion oil production had reached the economic limit by pumping because of the large volume of return water being handled and excessive pulling costs. Eliminating these costs by flowing is making it possible to continue profitable operations even with the higher water oil ratio.

Cumulative oil production at the end of January, 1944, (74 months operation) from Lease "A" was 148,000 barrels or an average of 2,690 barrels per acre. This is equivalent to 87 barrels per acre foot of sand. Average total production per oil well was 5,480 barrels and average for total wells drilled was 3,020 barrels per well. Cumuative water injected was 2,574,000 barrels or an average of 46,800 barrels per acre. The cumulative water oil ratio was high at 17.4 to 1. The total water is equivalent to 1,510 barrels per acre foot of sand and represents an average of 117,000 barrels per injection well. The minimum cumulative water oil ratio was attained during the twentieth month and was no lower than 12 to 1.

Lease "B"

Oil production on lease "B" increased sharply the first and second months when the south line of oil wells were drilled offsetting injection wells drilled on Lease "A". The third month oil production reached 4.5 barrels per day per acre and during the eleventh month it was silghtly in excess of 6.6 barrels per day per acre. The sharp decrease in August, 1939, was caused by the general two weeks shut down in oil production. A new drilling program adding new acreage was started during the tenth month so it is not known whether or not the oil production the following month represented a true peak. Maximum production for the lease was attained in March, 1940, the sixteenth month, with a rate of 7.4 barrels per day per acre for approximately 72 acres. Production declined steadily from that time on until January, 1941, when it increased following additional drilling during the latter part of 1940.

An average water injection rate of approximately 25 barrels per day per acre was used during the first eleven months. It was then increased to about 40 barrels per day per acre where it was maintained until the middle of 1941. The decrease in rate after that was caused both by pressure drop resulting from addition of many new wells to the water system at considerable distance from the plant and by the normal fall-off of water injection into individual wells. Average production at the end of January, 1944, had decreased to approximately 1 barrel per day per acre.

The average water oil ratio fell rapidly the first two months to 8 to 1 and then gradually decreased to a minimum of 4 to 1 during the tenth month. From that time on it increased steadily until the middle of 1943 at which time it leveled off at about 15 to 1.

Average cumulate oil production rose rapidly the first two years to 3,200 barrels per acre at which time the rate of increase slowed appreciably. Because of the stepwise development of the lease the cumulative curve does not give a true picture of the acreage put under flood with the different drilling programs. Total oil production at the end of January, 1944, (62 months operation) was 551,000 barrels or an average of 5,510 barrels per acre and

184 barrels per acre foot. Average recovery per oil well drilled was 11,500 barrels and for total wells drilled 6,260 barrels per well.

To obtain this recovery a total of 4,877,000 barrels of water was used. This is an average of 48,770 barrels per acre or 1,630 barrels per acre foot. Average intake volume for the injection wells was 122,000 barrels each. The cumulative or overall water oil ratio at this point was 8.85 to 1. The minimum water oil ratio was 7.5 to 1 which occurred in July of 1941. Comparing these results with those for "A" clearly indicates a favorable improvement. Credit for this is believed by the operator to be due largely to the fact that drilling was confined more to the center of the shoestring sand so that fewer wells were drilled towards the extreme edges.

Lease "C"

Oil production on Lease "C" did not begin to increase from the flood until the middle of December, 1941, the fifth month. Production on the three months previous represent natural stripper production gained by new oil wells drilled. From the fifth month on flood production increased rapidly until it reached its peak of 8.3 barrels per day the twelfth month. The increase from the flood was longer in starting then on either Lease "A" or "B" even though injection rates during the early months were higher averaging about 45 barrels per day per acre the first six months .

It seems quite certain that this delay in increase was the result of a more even flooding action through the entire sand section made possible by selective shooting of the wells. Other evidence which substantiates this conclusion is the fact that at the end of the first six months when the oil production had reached 125 barrels per day the water production was only about 60 barrels per day with 80 per cent of it coming from an oil well located in watered sand. This well was converted to an input a few months later. Lease "B", on the other hand, had a water production of approximately 250 barrels per day coming from several wells at the time oil production first reached 125 barrels per day. In other words, at corresponding times in the flood life water production from "C" was only ⅛ as great as for "B". Similarly the field men report Lease "C" has continued to produce a smaller amount of water in proportion to oil than either Leases "A" or "B".

TABLE 1
SUMMARY OF DEVELOPMENT

	LEASE "A"	"B"	"C"
Acres Developed	55	100	58.3
Oil Wells Drilled	27	48	21
Water Wells Drilled	22	40.*	27
Total Wells Drilled	49	88	48
Oil Well Density, Acres per well	2.04	2.08	2.78
Water Well Density, Acres per well	2.50	2.50	2.16
Total Well Density, Acres per well	1.12	1.14	1.22
No. Wells Cored	1	2	48
Average Sand Section, Feet	39	38	30
Net Pay Sand, Feet	31	30	25
Total Shot, Quarts, Oil Wells	53	59	57
Total Shot, Quarts, Water Wells	26	25	57
Average Shot, Quarts per Foot, Oil Wells	1.77	1.97	2.37
Average Shot, Quarts per Foot, Water Wells	.79	.83	2.37

* All line wells originally charged to Lease "A" but in this summary have been divided equally between "A" and "B".

SUMMARY OF OPERATIONS TO JANUARY 31, 1944

	LEASE "A"	"B"	"C"
Time, Months	74	62	30
Cumulative Gross Oil Production, Bbls.	148,000	551,000	227,000
Total Gross Oil per Oil Well, Bbls.	5,480	11,500	10,800
Total Gross Oil per Water Well, Bbls.	6,730	13,800	**8,410**
Total Gross Oil per Well Drilled	3,020	6,260	4,730
Average Gross Oil, Bbls. per Acre	2,690	5,510	3,900
Average Gross Oil, Bbls. per Acre Foot	87	184	150
Cumulative Water Injected, Bbls.	2,574,000	4,877,000	1,486,000
Total Water Injected per Water Well, Bbls.	117,000	122,000	55,000
Avg. Water Injected, Bbls. per Acre	46,800	48,770	25,500
Avg. Water Injected, Bbls. per Acre Foot	1,510	1,630	1,020
Cumulative Water Injected-Produced Oil Ratio	17.4	8.85	6.55

SUMMARY OF ESTIMATED ULTIMATE RECOVERY

Total Time, Months	145	102	83
Gross Oil Recovery, Bbls.	170,000	615,000	359,000
Average Oil Recovery, Bbls. per Acre	3,100	6,150	6,160
Average Oil Recovery, Bbls. per Acre Foot	100	205	246
Average Oil Recovery per Total Wells Drilled	3,470	6,990	7,480
Average Oil Recovery per Oil Well Drilled	6,300	12,700	17,100

Note: Economic limit assumed to be 0.5 barrels per day per acre.

It was originally decided to hold injection rate on "C" at approximately 5 barrels per foot of net sand per day. Later it was found advisable to restrict the rate below this figure because of the thick sand sections in some wells and a temporary curtailment in drilling. Water injection decreased to 29 barrels per day per acre in August, 1942, and then remained fairly constant until near the middle of 1943. About that time well-head pressures began falling as more intakes were added to the water system on leases to the north.

A decrease in maximum well-head pressure from 650 to 575 pounds per square inch was accompanied by a decrease in injection rate to 25 barrels per day per acre. In fact the actual decrease on all but a small part of the lease was even greater as the average was held up because of increased volumes of water into two Stray sand wells on the northeast end of the lease. The drop in injection rates resulted in a sharper decline in oil production after the middle of 1943. Up until that time production was following closely the anticipated decline. The sharp increase in water oil ratio after the middle of the year is also largely due to the increased rates in the two wells and decrease in the others.

Average water oil ratio dropped fast the first nine months but slower than for "A" and "B". It reached a minimum of 3.5 to 1 the twelfth and thirteenth months and then started increasing gradually until the middle of 1943 when it took the sharper turn upwards.

Cumulative oil production for Lease "C" at the end of January, 1944, (30 months operation) was 227,000 barrels or 3,900 barrels per acre. This is equivalent to an average of 156 barrels per acre foot, 10,800 barrels per oil well drilled or

4,730 barrels for each new well drilled. A total of 1,486,000 barrels of water had been injected into the sand or an average of 25,500 barrels per acre. The average per water well is 55,000 barrels. Cumulative water oil ratio was also very good being only 6.55 to 1. The minimum cumulative ratio reached in February, 1943, was 6.1 to 1. Comparing the cumulative curves for Lease "C" with those for "A" and "B" indicates the better flooding efficiency that is being maintained. Again comparison with "B" shows that at the time the oil recovery for "B" reached 3,900 barrels per acre a total of 30,900 barrels of water had been injected so that for the same recovery "B" required 5,000 barrels more water per acre flooded.

Estimated Ultimate Oil Recovery

Estimate of the ultimate oil recovery expected for the three leases are given in Table 1 along with the development and operating summaries. If operating conditions on a water flooding project are held fairly constant it is possible to extrapolate future recovery in a way similar to that used for predicting future natural production. Such a method has been used here. Since "A" is flowing at the present time its estimate includes flowing production; however, economic life for "B" and "C" is based on pumping operations in order to get a comparison that will eliminate the hazards of predicting the amount of additional oil that can be profitably recovered in late stages by flowing. Such recovery should be relatively the same for both leases.

The estimated total recovery for "A" is 170,000 barrels, for "B" 615,000 barrels and for "C" 359,000 barrels with a total of 142,102 and 83 months operating life for each of the three. The average per acre recovery would then be 3100, 6150 and 6160 barrels. From this it would appear that "B" and "C" were going to give similar results, but when sand footage is considered the average recovery becomes 100, 205 and 246 barrels per acre foot respectively. This indicates that the average recovery from "C" should be about 40 barrels per acre foot greater than for "B". Assuming then that the quality of acreage on a per foot basis was approximately the same for both at the start of secondary operations it follows that the ultimate recovery from "C" should be about 20 per cent or 1,000 barrels per acre higher than it would have been had it been developed and operated in the same way as "B". This represents a very good return indeed on the additional investment and costs incurred by the detailed work on "C".

From the little old productive history available for the two leases together with observations made by experienced operators during the drilling of both leases it has been reported that "B" should be a better lease than "C". From the results to date, however, it seems that because of methods used "C" is going to do better than "B" on a unit basis even though the quality of "C" may have been inferior at the outset.

It may also be concluded that had similar methods been used on both "A" and "B" their ultimate recoveries could have been increased considerably. Average estimated recovery for the three based on total wells drilled is 3470, 6990 and 7480 barrels of oil per well while for oil wells drilled it is 6300, 12700 and 17100 barrels per well. If the production from "B" could have been increased 20 per cent it would have amounted to 1,500 additional barrels of oil per well for total wells drilled.

Deep Flooding

Most of the water flooding projects in the Mid-Continent have been carried on at depths between 200 and 700 feet although two successful deep floods at 1,200 and 2,000 feet have been in operation for some six years. Furthermore the common well spacing used has been 330 feet by 330 feet with a few floods using a spacing of 440 feet by 440 feet For a long while flooding at depths below 1,000 feet was considered an impossibility from the standpoint of economics; however, during recent years several projects have been started at depths varying from 2,000 to 2,800 feet.

The ultimate success or failure of these deeper floods has not at this time been definitely ascertained but initial results have been favorable. The normal practice for the deeper work has been to continue to use most of the old producing wells originally drilled on ten acre locations and to complete a five-spot pattern by drilling new water injection wells in the center of ten acre locations bounded by four oil wells. Inasmuch as the old producers on these deeper floods were in better condition than those in the shallow areas the use of them appears to be satisfactory. Following such a program a lease with sand depth of 2,000 feet can be developed for very nearly the same per acre cost as that incurred at depth of 500 feet when all new wells are drilled on a 330 foot by 330 foot spacing.

The usual source of water for these deep floods is a shallow salt water horizon at a depth of approximately 800 feet. Water is handled in a closed system. It is pumped with individual pumping jacks and supplied to the oil sand of the inputs under gravity head alone.

Average gravity of produced oil from the deep Bartlesville floods is about 41 degrees A.P.I. at 60° F. The bottom-hole temperature is approximately 109 degrees and the viscosity of the oil at this temperature approximately 2 centipoises.

Core data has not yet supplied the same amount of information for these deeper sands as for the shallow sands because of the high degree of flushing which occurs. Most of the cores cut with water-base muds are flushed to residual oil saturation after water flooding and contaminated with drilling water. Oil cores are being used with some success to determine interstitial water but are valueless for oil content due to the high degree of contamination from the coring oil. Use of core analyses from these sands is limited at this time. They have about the same relationship to field application that existed in Pennsylvania ten years ago when core analyses were first being developed and attempts made to apply results to field operations. It seems reasonable to believe, however, that as field experience becomes available for purposes of correlation with analytical results that cores may also be used successfully for evaluating oil recoveries from these deeper sands in addition to the use made of permeability determinations and character of formation as shown by the core.

With the present price of oil these deeper flooding operations may not be too profitable; however, oil pro-

duction resulting from them at this time strongly indicates the feasibility of flooding at greater depths by the use of wide well spacing and old producing wells.

Conclusion

Water flooding operations on shallow sands has proven economically feasible in the Mid-Continent on those leases which have the necessary favorable conditions of oil saturation and floodability at the inception of secondary work. From operations here described it may be concluded that ultimate recoveries may vary widely, solely because of different development and operating methods used. It is estimated that the ultimate oil recovery by water flooding for the lease which was subjected to detailed development and control will be 20 per cent greater than it would have been without such control. This will represent an increase of approximately 1,000 barrels per acre or four times the cost of additional expenditure required to effect the gain. The advantage of detailed engineering together with close cooperation with the men in the field is also evident. A competent field man in direct charge of lease operations and in constant contact with day to day results is essential for maximum ultimate recoveries. The engineer can not do the job alone.

Deep flooding has not been in use long enough and on a broad enough scale in the Mid-Continent area to tell whether or not such operations are profitable under present economic conditions; however, the initial results obtained have been favorable enough to promote additional projects. Conclusions as to whether or not these deep operations will be profitable must necessarily be delayed until a later date when sufficient data has been obtained; however, at the present time the outlook is favorable. It can be concluded that deep flooding with wide well spacing is physically possible and feasible so that the ultimate answer of success or failure depends upon cost of development and operating balanced against selling price of oil produced.

1/ Earlougher, R.C., "Water-flooding Efficiency Aided by Laboratory Flooding Tests". Oil Weekly, Vol. 105, No. 6, pp. 21-24, April 13, 1942.

2/ Earlougher, R.C., "Relationship between Velocity, Oil Saturation, and Flooding Efficiency". A.I.M.E., Austin Meeting, October, 1942.

Presented at the
Spring Meeting of the
Pacific Coast District of the
American Petroleum Institute,
Los Angeles, California
March 23, 1944.

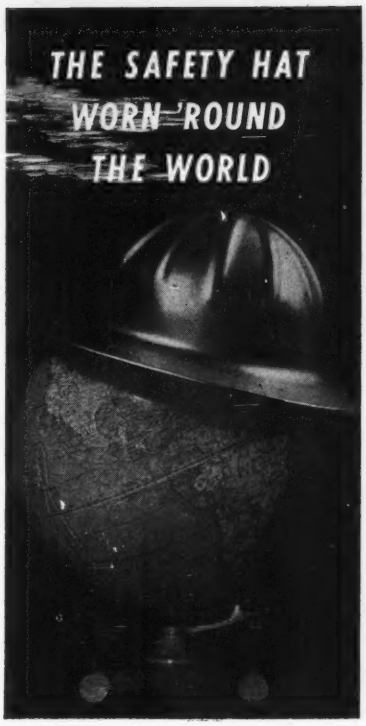
Edison Test Abandoned

Northwest of the producing limits of the Edison field the Seaboard Oil Corp. has abandoned Garrison-Davis No. 1. Located in section 30-29s-29e, the hole was bottomed in shale and gray sand at a total depth of 2359 ft. A string of 6⅝-inch casing was cemented at 2190 ft. and gun perforated in two stages opposite two streaks of poor oil sand which was found between the depths of 2100 ft. and 2160 ft. Both intervals tested wet and the hole was abandoned. The operator's future plans for the area are not known at this writing.

Superior Spuds Raisin City Test

Northwest of the producing limits of the Raisin City field the Superior Oil Co. is drilling Well No. F-34-10. Located in section 10-15s-17e, the well is currently making hole below 4800 ft. The objective of the well is the sands of the Eocene formation. South of this well in section 15, the Western Gulf Oil Co. is preparing to spud S.J.V. Prop. No. 71-15.

Buy Bonds



Back again!

THE McDONALD
Type "T"
SAFETY HAT

No longer on the restricted list, the famous McDonald "T" hat now comes in two shell sizes with an adjustable full-floating headband that makes a comfortable fit for any head-size.

Ask for new "T" hat circular

B. F. McDONALD CO.

MANUFACTURERS AND
DISTRIBUTORS OF
INDUSTRIAL SAFETY EQUIPMENT
5100-E So. Hoover Street
LOS ANGELES 37, CALIF.

Other Offices in San Francisco & Houston

Yes, sir, that's right! One of the many advantages of the Patterson-Ballagh Pipe Wiper is protection against the dropping of small articles such as broken slips, tong dies, hammers, chisels, and other tools which thereafter a constant fishing hazard. Another contribution of these Patterson-Ballagh Pipe Wipers is the elimination of wash water When the pipe is pulled from the hole, the mud or oil is squeegeed so completely that mud dilution is no longer a problem. With mud weight material hard to get, the value of this can be readily appreciated. Frequently, the saving in one day will pay for the wiper. These wipers have no exposed metal to spark; rig is safer as floor is dry; tubing and drill pipe is easier to inspect; the crew work and feel better when the pipe and floor are dry.

Many thousands of Patterson-Ballagh Pipe Wipers are in use throughout the world. It will pay you to investigate now. We will be glad to send you further information. Now made of PBX, the new oil resisting synthetic.

See Composite Catalog

PATTERSON-BALLAGH

Los Angeles 1 • Houston 10 • New York City 6

PATTERSON-BALLAGH PIPE WIPERS

A Report on Materials Required for Petroleum Industry Production Operations

By FRANK A. WATTS,
Director of Materials,
Petroleum Administration for War.

The accompanying report to the Petroleum Industry War Council on the materials situation in the petroleum industry is the last made by Mr. Watts before his resignation as director of PAW's Division of Materials. As a summary of conditions with reference to the availability of equipment in the first three quarters of this year it will be of interest to all active West Coast oil operators. Mr. Watts' successor in PAW is Claude P. Parsons. An announcement of his appointment appears in another column.—Editor.

Second quarter 1944 controlled material allotments have been made to each of the fourteen WPB Claimant Agencies, including the Petroleum Administration for War. It is from PAW's allotments of controlled materials—carbon steel, alloy steel, copper, and aluminum in the forms and shapes originally produced—that second quarter materials must be obtained to supply the requirements of domestic petroleum operators.

Allotments of 465,000 tons of carbon steel, 93,520 tons of alloy steel, and proportionate amounts of copper and aluminum were made to PAW. Of the 465,000 tons of carbon steel, it is estimated that 80,815 tons will be required for refining, transportation, natural gasoline plant, and other construction; 280,000 tons for production operations; 68,685 tons by the petroleum equipment manufacturers; and 35,500 tons for the maintenance and repair requirements of production, transportation, natural gasoline, refining, and marketing operations. Of the 93,520 tons of alloy steel, it is estimated that 1,020 tons will be required for construction operations; 52,000 tons for production operations (including N-80 casing and tubing); 35,000 tons by the petroleum equipment manufacturers; and 5,500 tons for maintenance and repair requirements. The largest single item of both carbon steel and alloy steel is oil country tubular goods. Of the 332,000 tons of carbon and alloy steel (280,000 carbon plus 52,000 alloy) for allotment for production operations, 262,000 tons will become casing, tubing, and drill pipe. The difference will become line pipe, wire rope, structural steel, and relatively small quantities of other forms and shapes required for production operations.

In addition to the oil country tubular goods to be produced by our pipe mills for domestic petroleum operators, they must produce casing, tubing, and drill pipe for the foreign operations. These requirements will represent approximately 10 per cent of the total oil country capacity of our pipe mills. The domestic and foreign requirements for oil country tubular goods, added to the tubular requirements of our Military—the majority of which must be produced by the same mills who deliver oil country tubular goods—will represent the full capacity of those pipe mills producing oil country tubular goods.

The casing, tubing, and drill pipe, scheduled for production and delivery during the second quarter of this year, will be sufficient for the conduct of all presently planned drilling operations. This is particularly true if operators acquire no more material than they plan to use during the second quarter. We can not emphasize too strongly the need for the continued and wholehearted cooperation of all production operators acquiring oil country tubular goods or other materials required for production operations. Controlled material allotments should be obtained for no more material than will be acquired for use. Whenever it is determined that an allotment has been obtained for more material than will be required, the excess part of the allotment should be promptly returned to the PAW District Office from which it was obtained.

It is extremely important that all allotment checks issued by PAW be cashed and converted into materials required for petroleum use. Whenever a delivery order for oil country tubular goods or other controlled materials is cancelled, PAW should be promptly notified. This procedure will guarantee the return of unacquired material to PAW's allotment stockpile, where it will be available for acquisition and use by other petroleum operators. To the extent that a petroleum operator permits an allotment to die, some other operator, or the petroleum industry as a whole, is deprived of the use of material required for some petroleum operation.

Petroleum operators—particularly those in the production branch of the industry—should not acquire more materials than are required for use during the succeeding 90 days. When programs or planned operations are altered and oil country tubular goods and other items of controlled material are acquired in excess of an amount which will be required for use during the succeeding 90 days, the PAW Materials Redistribution Program No. 2 requires that the material in excess of the 90-day supply be reported to the appropriate PAW District Office on forms provided by the Redistribution Program.

Mill stocks of tubular goods carried by the pipe mills and field stocks and M-21-b-2 stocks in the hands of certain suppliers make these materials readily available for those production operators who are unable to plan their operations far enough into the future to enable them to order their requirements through normal procedures from regular mill rollings. These emergency stocks minimize, if not eliminate, the need for production operators' acquiring stocks of oil country tubular goods for operations which have not been definitely, or at least tentatively, planned.

A word or two about N-80 casing and tubing, and Grade "E" and special alloy steel drill pipe, would be timely because several production operators have complained about PAW's efforts to increase the use of carbon steel oil country tubular goods when it is generally reported that alloy steel is relatively more available than carbon steel. The heat treating capacity of the pipe mills will permit the production of just so much—and no more—alloy steel tubular material. Their total ability to produce alloy steel casing, tubing, and drill pipe is approximately 18 per cent of their oil country tubular goods capacity. Heat treating facilities can not and will not be increased until the European War picture permits further relaxations of construction regulations. PAW's interests have been toward reserving alloy steel tubular goods for use where depths or other conditions made it necessary to use this superior material.

Commencing with third quarter allotments for oil country tubular goods, PAW will not influence operators to use carbon steel, or not to use alloy steel. This relaxation will continue as long as operators confine their purchases of N-80 casing and tubing and alloy steel drill pipe for operations actually requiring the use of this material. This material is actually available in sufficient quantities for uses where depths or other conditions require its use. When any operator acquires this material for uses for which it is not required, some other operator will be deprived of its use for an operation where its use is required. PAW's alloy steel allotment for production operations is equal to the pipe mills' maximum ability to produce alloy steel oil country tubular goods. It is from that allotment that all N-80 casing and tubing, and Grade "E" and other alloy steel drill pipe, must be produced.

Generally speaking, supply and demand for drill pipe are now in balance. The cooperation of the mills producing drill pipe makes it possible to fill those orders of production operators who have an urgent need for drill pipe. Actually, there is no reason why the operator who plans his drilling operations reasonably well into the future is not able to obtain drill pipe by or before the time it is actually required. The Steel Division of WPB, PAW, and the pipe mills are in a position to cooperate and direct the delivery of drill pipe to those operators who are unable to plan their operations far enough in advance to obtain drill pipe deliveries through normal procedures for emergencies. Small amounts of drill pipe are being carried in field and mill stocks, where these are readily available to fill rush orders.

Drill pipe, of course, is of little value without tool joints. At the present time, the production of tool joints is lagging slightly behind the production of drill pipe. This is not an unhealthy condition. Although there continues to be a large backlog of orders for tool joints, these are now being produced at a rate which slightly exceeds net requirements. The order backlog continues at the 200,000 level. This number is nearly equal to the total 1944 requirements for tool joints. Tool joint manufacturers are gradually increasing their production and in the over-all picture are now able to fill any urgent order for tool joints. Splendid cooperation has been extended by the tool joint manufacturers in bringing supply and demand in balance. This is particularly true of one of the larger manufacturers who increased its production of tool joints by 50 per cent during the past three months. An occasional tool joint order is now being cancelled. During the past three weeks, there has been a slight reduction in the backlog of orders for tool joints.

Since an AA-1 rating was being assigned for tool joints required for MRO use and an AA-2X rating for those acquired for capital investment use, PAW amended Order P-98-b on February 24 to eliminate the assignment of preference ratings to delivery orders for tool joints. Simultaneously, PAW directed tool joint manufacturers to analyze the orders of their customers and fill delivery orders in the order of their urgency. During the present transition period, from a shortage of drill pipe and tool joints to a balanced and adequate supply of these items, production operators are urged to cooperate through PAW with drill pipe producers and tool joint manufacturers in order that these items may be delivered in the order of their urgency. The harmonious functioning of this arrangement will make it unnecessary for any operator to abnormally delay a drilling operation for lack of either drill pipe or tool joints.

Pumping unit manufacturers are gradually—but steadily—increasing their production of oil well pumping units. During the past three months, the production of pumping units has been increased by 22 per cent, from a total of 470 to a total of 568 units a month. If that rate of increase continues, the output will reach the 1940-41 average production by August 1 of this year. Based on today's rate of producing pumping units, the backlog of orders booked by all manufacturers is equal to nine months' production. If the output is returned to normal, today's backlog would be equivalent to seven months' production. Although we do not now know of any oil wells which are shut in for lack of pumping units, a shortage rather than a surplus exists. There will continue to be a greater demand than supply until the output has been increased to, or slightly in excess of the 1940-41 average. The continued cooperation of pumping unit manufacturers will prevent an actual pumping unit shortage and will remove the necessity for production operators' projecting their requirements as far into the future as has recently been necessary. PAW is energetically working with pumping unit manufacturers to assist them in expediting the delivery of bearings, gears, and other components required by them to take full advantage of their manufacturing capacity.

A direction was issued February 15 to Preference Rating Order P-98-b to permit employees of production operators to use P-98-b procedures to assign an AA-3 rating for the acquisition of materials required for use in constructing employee-owned cottages as a part of "lease equipment" as defined in Petroleum Admisitrative Order No. 11. The procedure eliminates much of the inconvenience which was formerly necessary for production employees to acquire materials required for the construction of temporary homes ad-

jacent to or a part of oil production camps built in or adjacent to oil fields which are isolated from communities with adequate housing facilities. The direction permits the continuation of a well established arrangement which has existed for several years and provides inexpensive homes adjacent to the work of oil production employees. The arrangement is particularly desirable at the present time when transportation is at a premium and it becomes increasingly difficult for employees to get to and from production operations which are usually developed at comparatively inaccessible locations. This is particularly true during rainy seasons, for petroleum operations are located where oil is discovered—not where good roads are built.

When we think about an accelerated petroleum program, our thoughts naturally turn to an item which has been giving the petroleum industry—particularly the production operator—increasing concern. That item, you will agree, is new trucks and repair parts required to maintain existing trucks.

Plans are rapidly taking shape which it is hoped will provide a minimum but adequate supply of repair parts for the essential automotive equipment of this country, including that of the petroleum industry. In the meantime, petroleum operators who are unable to obtain components required for the repair or maintenance of their trucks are invited to apply for help to the Vehicle Maintenance Specialist of the nearest ODT office. There is a full realization on the part of the Office of Defense Transportation and the Automotive Division of the War Production Board that truck equipment required for petroleum operations must be maintained. These needs head the Urgency List because it is fully realized that petroleum and petroleum products cannot be produced, manufactured, or transported unless the industry's transportation system is adequately maintained.

A small portion of the new trucks now rolling off the manufacturers' assembly lines are being directed for civilian use. We are told that during January, 3,000 new trucks were produced and delivered for civilian use. It must be recognized, however, that during 1944 and 1945, the demand for trucks in this country will exceed the supply, and new trucks must be delivered to fill requirements in the order of their urgency. Since petroleum operations head the Urgency List, petroleum operators will usually be able to obtain new trucks whenever real needs exist and the operators' applications explain and establish the needs. All truck dealers are glad to assist petroleum operators to fill out applications for trucks. As a last resort, the Allocation Officer of ODT will render this service. The petroleum program is an accelerating one and will require an increasing supply of trucks. This fact is generally recognized by ODT, WPB, and PAW.

Since the supply of new trucks is limited, petroleum operators are urged to apply only for such new vehicles as are required for essential operations. They are then urged to prepare, file, and follow through on their applications. Although the petroleum operator will seldom need assistance from PAW either to amplify or to back up the operator's need for trucks, PAW Washington and District Offices will be glad to assist any operator to obtain trucks required for essential petroleum operations.

Repair parts for the thousands of internal combustion engines which are in use in drilling, production, transportation, and other petroleum operations are being delivered to oil field engine distributors and suppliers in steadily increasing quantities. As the stocks of these distributors and suppliers increase, it becomes proportionately unnecessary for petroleum operators to continue to carry their own stocks of engine repair parts. The majority of—but unfortunately not all—internal combustion engine manufacturers realize that engines are required for the successful conduct of petroleum operations and that, without these operations, fuel cannot be supplied for the vast number of engines required for the military operations of this Country and our Allies. Most engine manufacturers are therefore cooperating in an effort to produce, and channel to their oil field distributors and suppliers, an adequate stock of repair parts to maintain the thousands of engines required for use in petroleum operations. If your engine distributors or suppliers are not now acquiring and maintaining an adequate stock of engine repair parts, you should **impress** and **re-impress** on the distributors their need for acquiring and maintaining a minimum but adequate stock of repair parts. These are required not only in your operations but also for the other petroleum industry customers of the particular distributor.

Some engine manufacturers are now cooperating to their utmost to produce and deliver new internal combustion engines required for petroleum operations. A portion of these engines will move directly from manufacturers to petroleum operators, while others will pass through the hands of the oil field distributors and suppliers en route from manufacturers to petroleum operators or equipment manufacturers. Since there is a lead time of about six months between the day raw materials are delivered to manufacturers and the day assembled engines are available for use, it continues to be necessary for petroleum operators and engine distributors to cooperate and place orders with engine manufacturers far enough in advance of the time the engines are required to guarantee an adequate supply for petroleum use. Here again the oil field engine distributors and suppliers are initially responsible for an adequate supply of new engines required for an accelerated petroleum program.

PAW has a Section constantly working with WPB, the Military, and engine manufacturers in an effort to provide a steady flow of engines and engine parts to the petroleum industry which is equivalent to its needs for both new engines and repair parts for existing engines. Engine distributors and petroleum operators should feel free to call on PAW for assistance whenever there is any indication that new engines or repair parts are not being delivered in sufficient quantities to safeguard petroleum operations. In spite of the fact that the Military demands for engines are as great as they are, it will usually—but not always—be possible for PAW to ex-

pedite their delivery for petroleum use. It now appears that a sufficient supply of both new engines and repair parts for old engines can be made available for petroleum operations if the oil field engine distributors and suppliers and the petroleum operators plan their engine requirements reasonably well into the future and cooperate with the War Production Board, the engine manufacturers, and PAW.

Last week authority was obtained for and extended to the manufacturers of rotary rock bits and core bits to acquire alloy steel which will enable them to manufacture rocks bits and core bits equal or possibly greater in life than pre-war bits. Under the new arrangement, alloy steel which will be available to bit manufacturers for use in cutters, cones, and other working and formation cutting components is the identical alloy steel they used before it became necessary to acquire "National Emergency" steels. The alloy steel scrap situation makes it necessary that manufacturers continue the use of "National Emergency" steel for bit bodies. The use of SAE 4815 alloy steel in cutting and working components should enable the manufacturers to take full advantage of any changes in bit design engineered during the past two years to increase the efficiency and life of bits.

There is, of course, a lead time of about three or four months between the day alloy steel is scheduled for production by a steel mill and the day the steel is available to production operators in the form of rock bits. That situation is unavoidable and it will be necessary to continue the use of present quality bits for another three or four months, after which new bits will be generally available. However, the bits which you are today receiving and using are definitely superior in quality to those which you were using a few months ago. Our rotary rock bit manufacturers are to be complimented for the quality of bits which they have been able to produce from the inferior qualities of "National Emergency" steels which they have been required to acquire and use.

In order to supply the Military and other essential demands for alloy steel, it became necessary to prohibit its use in a large number of items and to require the use of lower than normal grades of alloy steel for the majority of uses. Although the alloy steel situation has now improved to the point that alloy steel itself is available in sufficient quantities to supply the majority of needs, it is not possible to make pre-war quality alloy steel available for all normal uses. To provide a balanced supply of steel, it is and continues to be necessary that alloy steel scrap, as well as carbon steel scrap, be used in the production of new steel — therefore our "National Emergency series of three-way alloy steel which requires the maximum use of alloy scrap.

Most petroleum equipment manufacturers are increasing their production of equipment required for oil well drilling and oil producing operations. Supply and demand for the majority of these items are rapidly getting in balance. PAW is now able to allot to any equipment manufacturer all material required for his production of equipment required in petroleum production operations. In addition, PAW is in position to expedite the delivery of components — bearings, castings, forgings, etc.—required in the manufacture of this oil field equipment. If you are experiencing any difficulty in obtaining repair parts for equipment now in use by you, or in acquiring new equipment required in your production operations, you should emphatically impress on your suppliers their need for manufacturing and delivering an adequate supply of repair parts for the maintenance of equipment now in use, or later to be placed in use, and also a sufficient supply of new material for the conduct of petroleum operations at the necessarily accelerated rate.

Present indications are that nearly 1400—to be exact, 1381—rotary rigs are now in operation in this country. That number is 20 more than the 1943 high which occurred on December 21, 300 more than the 1940 average, 200 more than the 1941 average, 600 more than the 1942 average, and 370 more than the 1943 average. You must bear in mind that these figures take into consideration only those rigs which are actually drilling at the time of the report and do not include those which are rigging up, tearing down, or moving from one location to another. Since nearly 40 per cent more time is now required to drill and complete the majority of rotary wells than was required during 1939, 1940, and 1941, new wells are not being completed as rapidly as the drilling rig comparison would indicate.

As stated in earlier reports, there is every indication that drilling operations will be conducted during 1944 at a considerably greater rate than during any recent year. The accelerated program is one which is required to supply petroleum and products to fill Military and other essential demands. The accelerated program is one which will require the wholehearted and planned cooperation of those petroleum equipment manufacturers who, during normal years, supplied oil well drilling machinery and oil producing equipment. On these equipment manufacturers, the industry must continue to depend for these items of material. These are the same manufacturers from whom foreign petroleum operators, as well as domestic operators, obtain practically all equipment in oil production operations.

The other day PAW authorized the manufacture of welded lease tanks in addition to the bolted tanks. Their production had been prohibited until this authorization was granted. Both welded and bolted tanks are now obtainable for production operations. Tank manufacturers and petroleum operators are urged, however, to keep the weight of the welded tanks down to the minimums established by API standards and thereby conserve the use of steel in the manufacture of oil field equipment. After all — there continues to be a greater demand than supply of material required to fill Military and other essential demands. Petroleum operators must continue with the programs which they have so effectively conducted during recent years by conserving the use of new materials; and salvaging, rehabilitating, and re-using idle facilities and materials. Conservation programs which were effectively conducted during recent years should be energetically continued.

Radioactivity Well-Logging Bulletin Published

"Lane-Wells Radioactivity Well Logging" is the title of the new fifty-two page bulletin, just published by Lane-Wells Company, according to M. E. Montrose, vice-president.

Radioactivity Well Logging is an advanced method of determining bore-hole formation characteristics in both cased and open hole. The Bulletin discusses the nature of radioactivity and the applications of the logging service to the problems of the petroleum industry.

Typical curves and sections are reproduced from nearly all the principal oil field areas in the United States. Since Radio-activity Well Logging can be used effectively through casing, methods and techniques are presented for application to the service to work-over and remedial programs.

The Bulletin is the most complete work published to date covering the actual field experience of Radioactivity Logging. Many of the curves are shown together with electrical logs of the same wells.

Copies of the Radioactivity Well Logging Bulletin are available to oil company executives, petroleum engineers, geologists and field superintendents from Lane-Wells Company, 5610 South Soto Street, Los Angeles 11, California, or the nearest Division office.

New Edition "Riggers' Hand Book" Just Off the Press

The Broderick & Bascom Rope Co. have just issued a new edition of their "Riggers' Hand Book." Although it contains more pages than the previous issue you don't have to dig through a big collection of words to get helpful information. It is mostly pictures and practical tables.

When to choose the different types of slings, what the working loads are, where to look for wear, how to measure — these fundamentals may seem like old stuff, but brushing up on them will pay dividends in prolonged rope life and increased output. In the section of the book devoted to Yellow Strand Braided Safety Slings it shows how their flexibility simplifies handling awkward, slippery or odd-shaped loads. The patented braiding of this nonkinking type permits a soft-sure-gripping sling without surplus weight or bulk.

The book is small enough to fit into your pocket and a copy may be had by sending a request on your company letterhead to Broderick & Bascom Rope Co., 4203 N. Union Blvd., St. Louis 15, Mo.

The company also has an 80-page "Drillers' Hand Book" which will be sent on request to drillers, or anyone using or buying wire rope.

Square D Issues New Booklet

A new 28-page booklet of convenient pocket size entitled "Care and Maintenance of Electrical Equipment" and containing simple instructions for keeping switches, panelboards and switchboards in good operating condition has just been printed. The booklet, fully illustrated, also contains a parts ordering list of Square D electrical Equipment. It may be obtained without cost from Square D Company, 1318 East 16th Street, Los Angeles 21, Calif.

Kelite Markets New Product

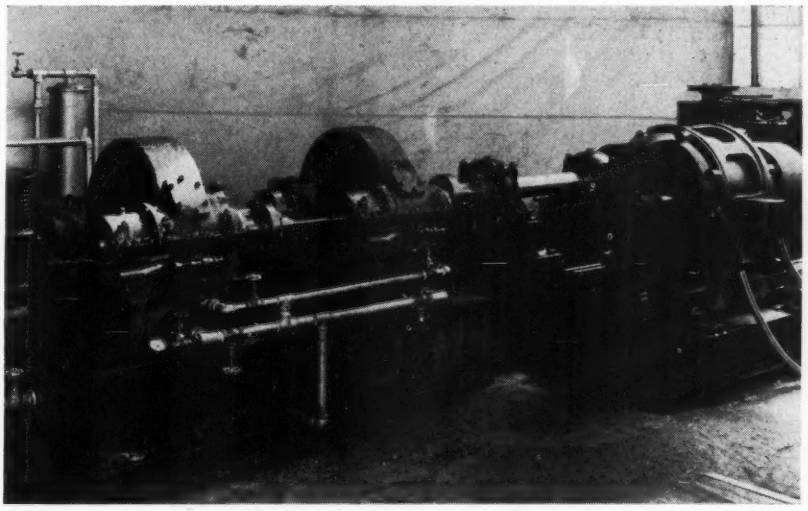
A fast-working remover of heavy grease and crude oil deposits has been developed by Kelite Products, Inc. for oil field use. It is used most successfully in a mixture with kerosene, being sprayed on the rig before steam cleaning.

A powerful "wetting-out" agent and a controlled pH, which is high enough for effective cleaning action but not too high for easy rinsing are important features of the new material. It is known as Kelite Pro-Star.

Meter Assn. Meets April 20th

The Southern California Meter Association will hold its monthly dinner meeting at the Rio Hondo Country Club, Downey, at 6:30 P. M., Thursday, April 20, 1944.

The program to follow the dinner will consist of a paper, "A Review of the More Common Methods of Determining Specific Gravity of Gas," by Messrs, B. O. Cossey and B. C. Sanders, both of the Southern California Gas Company. Demonstrating models of specific gravity recorders will be on display for illustration of the evening's subject.



ON THE TEST BLOCK — Pinion Speed 10,000 R.P.M.

Photo illustrates turbo-electric herringbone gear generators manufactured by Lufkin Foundry & Machine Company, Lufkin, Texas, for Navy ships. The finest precision work is required on these turbo-electric generators, the pinion traveling at the rate of 10,000 R.P.M.

Lufkin was able to quickly convert their facilities from peacetime to war production of turbo-electric generators, ship propulsion gears (1000 H.P.) and General Sherman tank gears. The Company is fast turning back to civilian production of oil field pumping units as plant equipment is released. The Company has undergone considerable expansion since Pearl Harbor and are said to have the largest and most modern gear shop in the south.

Yunker Heads Stripper Well Assn.

Election of Chester F. Yunker, general superintendent of the Del Amo Estate Company and well-known California oil man, to the presidency of the California Stripper Well Association was announced on March 20th. The election took place at the annual meeting of the board of directors of the state-wide independent oil trade group held in Los Angeles.

Chester F. Yunker

Edwin P. Crail, president of Crail Bros. Inc., E. F. Demond, vice president of Exeter Oil Company, Ltd., and V. R. G. Wilbur, independent oil operator were elected as vice presidents; Thomas H. Work, of the Nordon Corporation, was re-elected secretary-treasurer, and Richard Fenton, executive vice-president of the association since its organization, was likewise re-elected.

Yunker, the new president of the stripper well association, succeeds Robert C. Davis, who served as head of the organization for the past year. The newly elected official is a resident of Long Beach where he has been active as an oil producer for approximately twenty years. Early in his career he was resident geologist for the Richfield Oil Company; chief petroleum engineer for the Italo Petroleum Corporation; and later became a consulting petroleum engineer and then oil producer in his own name. It was at this time that he discovered the well-known Yunker Sand at Long Beach.

In 1941 Yunker became general superintendent of oil operations for the Del Amo Estate Company which owns a large number of wells in the Torrance oil field. In addition to his oil activities Yunker is a member of the board of directors of the Western Bank of Long Beach, California.

Directors re-elected to serve for the ensuing year are: P. N. Baker, Shasta Petroleum Co.; George F. Brayton; Edwin P. Crail, Crail Brothers; Robert C. Davis, Davis Investment Co.; E. F. Demond, Exeter Oil Company, Ltd., Chester F. Dolley, Atlantic Oil Co.; Neal Elder, Morton and Elder; D. W. Elliott; Richard Fenton; Jack Herley, Herley-Kelley; A. S. Johnston, A. S. Johnston Drilling Corp.; H. H. Lewin, Apex Petroleum Corp.; A. W. Lyddon, West American Oil Company; A. D. Mitchell; V. R. G. Wilbur; Thomas H. Work, Nordon Corp., Ltd.; and Chester F. Yunker, Del Amo Estate Company.

G. E. Appoints Caruthers Petroleum Specialist

Recognizing the need for additional engineering service to the expanding petroleum industry in the Bay Area, General Electric Company has appointed Robert W. E. Caruthers to its San Francisco staff, according to an announcement by M. Rhine, manager of the Industrial Division, Pacific District. He will make his headquarters in the Russ Building, San Francisco.

Because of his long and intimate association with the petroleum industry, Mr. Caruthers has an excellent background for his new position. A native of Como, Mississippi, he attended Mississippi State College and later, Yale University. He joined General Electric in 1926, taking the company's test course at Schenectady, N. Y. He transferred from the Switchgear Engineering Department to International General Electric Company, who sent him to Buenos Aires, Argentina, where he worked as assistant chief engineer. After several years, he returned to the United States and continued his studies at Yale.

He re-joined the General Electric Company in 1935, and again went "south of the border" . . . this time to Venezuela as G. E. Petroleum Industry Specialist and manager in Western Venezuela, Aruba, and Curacao, with headquarters in Maracaibo. He has recently arrived in San Francisco to take up his new duties.

Robert W. E. Caruthers

P. E. McGowan Passes Away

Private funeral services were held March 15th for Phillip Ellsworth McGowan, Vice President of Western States Gasoline Corporation, who had passed away at his home in Los Angeles. He leaves a widow, Mrs. Grace C. McGowan; a son, Charles L. McGowan; and a brother and sister, William J. and Susan R. McGowan, of San Francisco. Interment was made in Forest Lawn Mausoleum.

Mr. McGowan had been associated with the oil industry in California for many years, having been Vice President of Western States Gasoline Corporation for the past fourteen years.

BUY WAR BONDS

California Oil Men Appointed To A.P.I. Committees

The American Petroleum Institute Division of Production has announced the rosters of various committees and subcommittees, for 1944, which deal with production and natural gas problems. Several California engineers and technical men have received appointments.

W. H. Farrand, The Texas Co., has been announced as chairman of the California District Committee on Drilling & Production Practice, with Lot Bowen, Western Gulf Oil Co., as vice chairman. The members of the committee consist of T. A. Atkinson and J. O. Hills, General Petroleum Corp.; V. J. Beissinger, Richfield Oil Corp.; D. Duncan, Emsco Derrick & Equipment Co.; W. S. Eggleston and H. E. Winter, Union Oil Co.; R. E. Foss, Barnsdall Oil Co.; W. Greenfield, Signal Oil & Gas Co.; E. R. Love, Tide Water Associated Oil Co.; R. W. Marshall, Drilling & Exploration Co.; M. W. Morris, Standard Oil Co.; E. H. Musser, Calif. Div. Oil & Gas; H. T. Olson, Superior Oil Co.; C. T. Reichert, PAW; R. R. Robison, Shell Oil Co.; and E. W. Webb, Continental Oil Co.

San Joaquin Valley Section

J. T. Ledbetter is announced as vice chairman over the San Joaquin Valley Section of California District Committee on Drilling & Production Practice. The members include E. Armbruster, Shell Oil Co.; H. C. O. Clarke, Pure Oil Co.; A. B. Dooley, Belridge Oil Co.; F. A. Heitmeyer and V. Wankowski, Standard Oil Co.; J. P. Shea, Richfield Oil Corp.; F. M. Taylor, Robert S. Lytle, Inc.; F. L. Wadsworth, General Pet. Corp.; and T. H. Wallace, Western Gulf Oil Co.

Mud Test Committee

P. H. Jones, Union Oil Co.; W. R. Kelly, General Pet. Corp.; G. L. Ratcliffe, Baroid Sales; Wm. W. Robinson, Jr., The Texas Co.; K. L. Von der Ahe, Richfield Oil Corp.; and V. B. Zacher, Tide Water Associated Oil Co.; have been appointed among the members of the Subcommittee on Standard Field Procedure for Testing Drilling Fluids.

Topical Committee on Materials

T. A. Atkinson, General Petroleum Corp., has been named chairman of the California District Topical Committee on Materials. The members of this group include C. R. Napier, Tide Water Associated Oil Co.; R. R. Robison, Shell Oil Co.; D. E. Silcox, Standard Oil Co.; N. C. Wells, Signal Oil & Gas Co.; and H. P. Wickersham, Union Oil Co.

Oil Well Cement Subcommittee

Among the Pacific Coast men appointed to the Special Subcommittee on Oil Well Cements are F. E. Davie, Shell Oil Co.; P. H. Jones, Union Oil Co.; Wm. W. Robinson, Jr., The Texas Co.; and A. L. Tietze, Standard Oil Co.

Natural Gas & Gasoline

R. R. Crippen and J. A. Smith, The Texas Co.; G. B. Reece, Southern Counties Gas Co.; and B. G. Williams, Southern California Gas Co., have been appointed to the Central Committee on Measuring, Sampling and Testing Natural Gas & Natural Gasoline. Williams and Reece have also been selected to serve with others on Subcommittee 2-C on Sampling. D. M. Wolfe, Standard Oil Co., has been appointed to Subcommittees 2-A and 2-B on Analysis and Gas Measurement.

Shell Martinez Refinery Awarded "E"

Colorful and impressive ceremonies with a military setting marked the award of the Army-Navy "E" flag for excellence in production of war materials—made at the Martinez refinery of Shell Oil Company, Incorporated, on Saturday, February 19, according to F. S. Clulow, vice president in charge of manufacturing.

The presentation on behalf of Under Secretary of the Navy, James Forrestal, was made by Rear Admiral Carleton H. Wright, USN, Commandant of the 12th Naval District.

Col. Wm. B. Cobb, USA, Secretary to the General Staff, Western Defense Command, awarded individual "E" award pins to Grace Carter and Joseph Peters, representing the large group of refinery employes.

Refinery manager, I. M. Hemphill, accepted the coveted industrial award from Admiral Wright on behalf of the employes and the company, while James Douglas responded to the presentation of the "E" pins for the employes.

Sweetser To Be Fafnir West Coast Manager

The Fafnir Bearing Company, New Britain, Conn., announces the appointment of Alan C. Sweetser as West Coast Manager with headquarters at Los Angeles. He will also direct the operations of the San Francisco and Seattle branches.

Alan C. Sweetzer

Before his association with The Fafnir Bearing Company he was representative for 18 years for the Stanley Tool Division of The Stanley Works in the South and Mid West.

He assumes his new position on March 15, 1944.

Paloma Distillate Plant to Operate Soon

May 15 is reportedly the date on which the Paloma distillate recovery plant will go on production. The plant is being constructed by the C. F. Braun Engineering Company and will process 50,000,000 cubic feet of high pressure gas daily. The process will recover distillate, natural gasoline and liquefied petroleum gas products. The residual gas will be cycled back into the formation to maintain the underground pressure for the recovery of additional distillate.

Renfro Heads California D & B Sales

Mr. Hugh H. Glen, President of the Emsco Derrick & Equipment Company of Los Angeles, announced on March 15th the appointment of Mr. Thomas L. Renfro as California Sales Manager of the D & B Division of the Emsco Derrick & Equipment Company. In this capacity, Mr. Renfro will assume responsibility for all sales and field store operations in California for the D & B Division of the Company.

Thomas L. Renfro

Mr. Renfro comes to Emsco with a wide background of sales experience in the Petroleum Equipment industry. A graduate of Baylor University at Waco, Texas, he spent several years in specialty sales work before joining the organization of the National Supply Company where he served in various capacities until 1930. From 1930 to 1934 he was with the Chicago Pneumatic Tool Co., Oil Tool Division, as field representative in the San Joaquin Valley. From 1934 to 1941 he was special field representative for the Oil Well Supply Co., also in the San Joaquin Valley. For the past three years, he has been city and field salesman for the Baash-Ross Tool Company of Los Angeles.

In addition to his broad sales experience, Mr. Renfro's intimate knowledge of store operation and management gained during his service in the Petroleum Equipment field particularly fits him for his new responsibilities with Emsco.

Garrison Named to G. E. Public Relations Post

F. Lowell Garrison succeeds Paul C. Wilmore as Public Relations Representative for the General Electric Company in the Pacific Coast area, according to an announcement by R. S. Peare, manager of the company's Publicity Department, Schenectady. He will continue to maintain contacts with all media having offices located in the west, from his established headquarters on the eighth floor of the Russ Building in San Francisco.

No stranger to the Pacific Coast, Mr. Garrison was born in San Jose, California, and graduated from the University of California, Berkeley, in 1929. He immediately joined General Electric, taking the test course in Schenectady.

For the past two years Mr. Garrison has been field engineer for the company's San Francisco office, contacting Bay area shipyards. Prior to this assignment, he was sales manager for the General Electric Supply Corporation, Butte, Montana.

Mr. Garrison lives in San Francisco with his wife and two children.

L. Lowell Garrison

Tivit Products Co. Organized

Tivit Products Co., a new manufacturer of equipment for maintenance cleaning and for metal processing and cleaning, has begun operations in Los Angeles with Bruce Wiswall as General Manager.

Tanks, steam pressure cleaners, portable pressure spray tanks, and a number of specialized units, including: Bench-size Tanks and Spray Booths for small parts cleaning and an automatic feeding injector hook-up known as "The Tivit Economy Steam Cleaner" are now in production.

Bruce Wiswall
(General Manager of Tivit Products Company)

In addition to manufacturing its standard lines, Tivit builds tanks to specifications and maintains a field engineering service, under the direction of M. P. Greffoz, which offers assistance in the designing layout, construction and installation of solution tanks and other equipment for metal processing and cleaning.

The seven-man rubber boat that has already saved the lives of many flyers forced down at sea now comes equipped with a box kite and antenna for SOS signals, a sail for navigating, oars, and a cover to prevent man-killing sunburn. This in addition to the food, water, flares, medical supplies, and patching kits which previously came with the ships.

Schwarzler Named As Foxboro Export Head

The Foxboro Company, Foxboro, Mass., makers of industrial instruments for measuring, recording and controlling variables in industrial processes, announces the appointment of Mr. Charles Schwarzler as Manager of the Export Department, succeeding Mr. Henry B. Moelter who died, January 20th, following a brief illness.

Charles Schwarzler

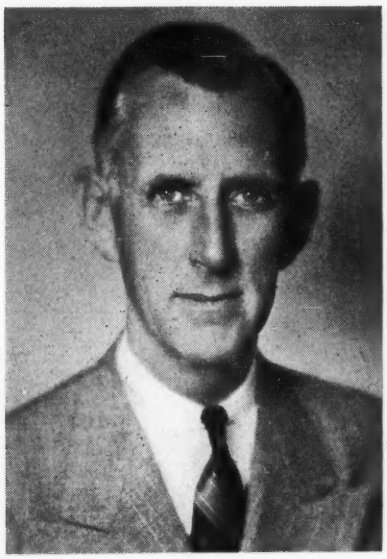
Mr. Schwarzler, formerly manager of the Sales Promotion Department, is a trained engineer, with ten years of experience in the application, promotion and sale of Foxboro Instruments. He has already assumed his new duties, to which he brings a background of varied and useful experience.

Garretson Resigns PAW Market Post

Chas. B. Garretson, Director of Marketing for District 5, Petroleum Administration for War, since the early organization of the Oil Coordinator's staff nearly three years ago, has resigned that post.

Immediately upon leaving PAW, Garretson began his new job as manager of a joint working staff being the new industry setup under direction of the Distribution and Marketing Committee and the Supply and Transportation Committee of District 5.

Offices of the staff have been opened at 1224 Security Title building, 530 West Sixth street, Los Angeles, Telephone TRinity 3481. R. L. Minckler has been loaned temporarily by the General Petroleum Corporation to aid in the organizational program.



C. B. Garretson

Purpose of the realignment announced recently is to provide an industry working staff, supplementing the official work of PAW, to facilitate the distribution of petroleum products to the war fronts when and where needed, and to assist in the equitable distribution of remaining available quantities.

Change of Stock Interests In International Cementers, Inc.

Byron Jackson Co. has acquired the interest in International Cementers, Inc. formerly owned by Schlumberger Well Surveying Corporation. The interests of Dowell, Inc., and Baker Oil Tools, Inc., remain unchanged. The corporate offices have been moved from Houston, Texas, to Los Angeles.

E. S. Dulin, of Byron Jackson Co., succeeds E. G. Leonardon, of Schlumberger Well Surveying Corporation as President of International Cementers, Inc. Other officers are, J. D. Chesnut, Executive Vice President, N. R. Crawford, Vice President and Treasurer, R. Henquet, Vice President, C. Penhaligen, Auditor, W. H. Wiese, Secretary and Assistant Treasurer. The operating personnel, with Ward B. Tennis acting as General Manager, remain unchanged.

Directors are, A. P. Beutel, J. D. Chesnut, N. R. Crawford, E. S. Dulin, Donald Y. Lamont, F. C. Merritt, C. Penhaligen and T. Sutter.

International Cementers, Inc. will continue its former operations as a leading organization in the cementing and acidizing of oil and gas wells. The modern "engineered" cementing units used in domestic fields also are available for sale in the export market. Based upon a vigorous research program, further expansion in cementing services and activities is anticipated.

E. S. Dulin
(Elected President International Cementers, Inc.)

A recently inaugurated service is general industrial chemical treatment for dissolving and disintegrating water-deposited scales and sludges from all types of heat exchange equipment. Following a careful analysis of the scales and sludges to be removed, blended and inhibited Dowell solvents are transported in specially designed mobile equipment, and applied by trained operators. Inasmuch as these inhibited solvents have no harmful effect on equipment, and penetrate wherever steam and water flow, no dismantling is necessary, and downtime is thus reduced to an absolute minimum.

Ideal for use in war plants, where savings of time are vital, this successful service will be made available in a number of industrial areas as promptly as additional equipment can be secured and placed in operation.

THIS LAUGH

OFF!!

A chiropractor is a man who gets paid for what other guys get slapped for.

She was only a fireman's daughter—and pop had to put out her flames every night.

Just as the dentist was leaving, his telephone bell rang. He answered it and found that a patient wished to come that afternoon. "I'm afraid I can't give you an appointment for this afternoon," the dentist replied. "I have 18 cavities to fill."

And he hung up the receiver and hurried off to the golf course.

The boss discovered he had left his pocket knife at home. He tried to borrow one from his staff, but each man said he either did not have a knife or had failed to bring it to the office with him. It was finally Jimmy, the office boy, who supplied the missing article.

Admiringly the boss exclaimed, "How is it, Jimmy, that you alone out of the entire staff seem to have a pocket knife on you?"

"Dunno, Sir," was the matter-of-fact reply, "unless it's because my wages are so low I can't afford more'n one pair of pants."

He got a raise.

He: "You're a nice girl."

She: "Yes, and I'm getting sick and tired of it."

Knees are a luxury. If you don't think so, just try to get hold of one.

The lady journalist and author had just been introduced to the Hollywood movie magnate, and wanted to make a hit with him by discussing literature cleverly, so she said:

You know, Mr. Goldberg, I just love Keats."

"Dot's fine," he said. "I'm always glad to meet a young lady vot lofs children."

"No," complained the Scotch professor to his students, "ye dinna use your faculties of observation. Ye dina use them."

Picking up a jar of chemical of vile odor, he stuck one finger into it and then into his mouth.

"Taste it, gentlemen!" he commanded, as he passed the vessel from student to student.

After each, with a frown and a shudder, had prodded a finger into the terrible concoction and tried it, the old professor exclaimed triumphantly:

"I tol' ye so. Ye dinna use your faculties. For if ye had observed ye would ha' seen that the finger I stuck into the jar was nae the finger I stuck into my mouth."

"Just a moment, lady," said the lisping shoe clerk. "I'll have to look up your thize."

Nothing helps a girl's popularity like being easy on the aye.

Leonard Lyons was visiting a friend, the superintendent of a mental hospital, the afternoon a patient was being discharged as cured.

As the patient was preparing to leave the superintendent called him in and asked about his plans.

"Well," replied the patient, "I was admitted to the bar, so I may practice law. I used to be an accountant, so I may become a bookkeeper. I speak six languages, so I could be an interpreter. If I find the going tough, I may become a house painter or a carpenter."

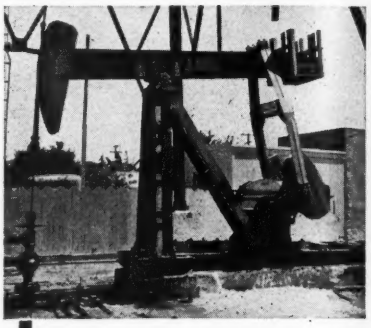
With that he arose, placed his left hand on his hip, the back of his other hand against his forehead, extended his fingers, and added, "Or—I may become a tea kettle!"

"Your wife has been delirious all day," said the nurse, in a worried tone, "calling for you and crying for money."

"Hah," snorted friend husband, "delirious, hell!"

BUY

WAR BONDS



Open Letter to California Producers

GENTLEMEN: We believe any well is likely to be more profitable and satisfactory when equipped with a JENSEN Pumping Unit.

And we should know. Pumping equipment has been our business for 25 years and we work with some pretty smart producers.

If you want a fresh conception of cheap, dependable production, try just one JENSEN Unit. You'll be surprised. Meantime, see our pages in your new Composite Catalog or write for Bulletin No. 27.

California Representative

A. V. TURNER

445 W. 6th, Downey, California

Phone: Topaz 2-2410

Stocked By

THE OIL TOOL CORPORATION

3075 Cherry Ave., Long Beach, Calif.

Phone 481-81

JENSEN

BROTHERS MFG. CO.

Coffeyville, Kansas, U.S.A.

EXPORT OFFICE: 50 Church St., New York City

Field Development

Los Angeles Basin

Mesa "Cat" Reaming

In Orange county, north of the town of Costa Mesa, Lovelady and Frambes are reaming Destiny No. 1, preparatory to running a string of 8⅝ inch casing. Located on section 9-6s-10w, the well was drilled to 1500 ft. where a drill pipe fish was left on bottom. The fish has now been recovered and the operators present plans call for coring to approximately 3000 ft. after setting the above mentioned string of 8⅝ inch casing.

Richfield Completes Long Beach Producer

In the east central portion of the Long Beach Field the Richfield Oil Corp. has re-completed Freeman No. 4. Located northwest from the intersection of 21 St. and Orizaba, the hole was plugged back from the old total depth of 6275 ft. and redrilled from 547 ft. to 3200 ft. A string of ⅝ inch casing was cemented at 3112 ft. and a 6⅝ inch perforated liner landed at 3198 ft. On the pump, the well tanked an initial gauge of 258 barrels of 24 gravity clean oil. The present production of the well is 173 barrels per day of 23.6 gravity oil cutting 1.0%.

Union Deepening Montebello Well

On the southerly flank of the Montebello field, the Union Oil Co. is deepening Howard and Smith No. 3. Located northeast of the intersection of Beverly Blvd. and Maple St., the well was originally completed in May of 1938, producing from the total depth of 6385 ft. The hole is now being deepened below 7800 ft. with the eventual depth of 10,000 ft. plus as the objective. Considerable difficulty has been encountered with loss of circulation since drilling below 7400 ft. This will be the second deep test well for this field, the other being the Standard Oil Co. Baldwin No. 82, which was drilled to a total depth of 9334 ft. in 1936.

Outpost Coring

Northeast of the easterly producing limits of the Dominguez field O. F. Darling is spot coring ahead in Carson No. 1. Located in section 35-3s-13w, the hole is being drilled below 5000 ft. The core recovery to date has consisted of gray sand and siltstone. The hole will be cored almost continuously for the next 200 to 300 ft. in search of the first Callender zone which is expected somewhere between 5100 ft. and 5200 ft.

Union Abandons Whittier "Cat"

Approximately four miles east of the town of Whittier, the Union Oil Co. has abandoned Sansinena No. 14. Located in section 32-2s-10w, the well was drilled and cored to a total depth of 4700 ft. and abandoned after finding the expected Whittier oil sands to be only water bearing at this location. No further work is contemplated in the area at the present time.

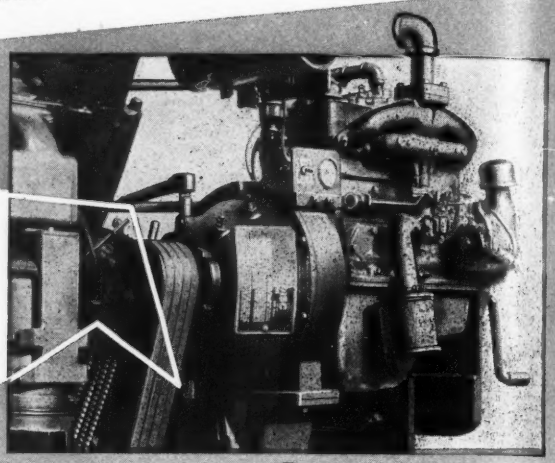
LOS ANGELES BASIN WILDCATS

Area	Well	No.	Section	Depth	Status
Athens	J. Paul Getty, Westmore	1	2, 3-14	6852	Drilling
Aliso Canyon	Barnsdall-Bandini Pet. Co., Roosa	1	29, 3-16	6627	Pumping
	Standard Oil Co., Frew	1-2	29, 3-16	9339	Testing
	Standard Oil Co., Del-Aliso	1	29, 3-16		Grade
Del Valle	Standard Oil Co., N. L. & F.	3-1	19, 4-17	7636	Redrilling
Dominguez	Cont. Expl. Co., Del-Amo	1	8, 4-13		Location
	Darling, O. F., Carson	1	35, 3-13	5013	Drilling
	Selbar Oil Co., Watson	1	17, 4-13	3200	Drilling
Downey	T.W.A.O. Co., Downey	10-1	4, 3-12	7822	Drilling
El Segundo	E. W. & H. R. Pauley, Loftus	1	11, 3-15	7256	Pumping
Elysian	Seaboard Oil Corp., Park	1	9, 1-13		Grade
Loma Verde	Shell Oil Co., Shell-Cont.	86-20	20, 5-17		Rigging up
Newhall	Pet. Expl. Co., Kraft	1	31, 4-15		Grade
Norwalk	Gen. Pet. Corp., Comm.	14-1	7, 3-11	2445	Drilling
Puente	Alleghany Pet. Corp., Rowland	1	14, 2-10		Location
	Hansen, Melvin, Corehole	3	24, 2-10	1650	Drilling
Seal Beach	Gilco, Inc., Well	1	10, 5-12	3160	Drilling
Sylmar	Richfield Oil Corp., T.I.T.	1	19, 3-15	8207	Prep. to test
Towsley Canyon	Haws & Ellsworth, H. E.	1	8, 3-16	100	Idle
Whittier	Union Oil Co., Sansinena	14	32, 2-10	4700	Abandoned
	Orange County				
Buena Park	Gen. Pet. Corp., Heath	1	34, 3-11	8265	Drilling
Costa Mesa	Lovelady & Frambes, Destiny	1	9, 6-10	1550	Reaming
East Coyote	Barnsdall O. Co., Sunny Hills Ranch	1	22, 3-10	6784	Testing
	San Bernardino County				
Chino Hills	Chino Hills Oil Co., Kraemer	1	33, 2-8		Rigging up
	Wm. Y. Lee, Corehole	2	21, 2-8	3005	Waiting on csg
Soquel Canyon	A. F. McCain, Soquel	1	6, 3-8	67	Drilling
	Imperial County				
Salton Sea	Pure Oil Co., State	1	26, 10-9		Rig
	Standard Oil Co., San Felipe	1	27, 11-9		Location

FAST GETAWAY ON A COLD ENGINE

FACTS about your Climax engine

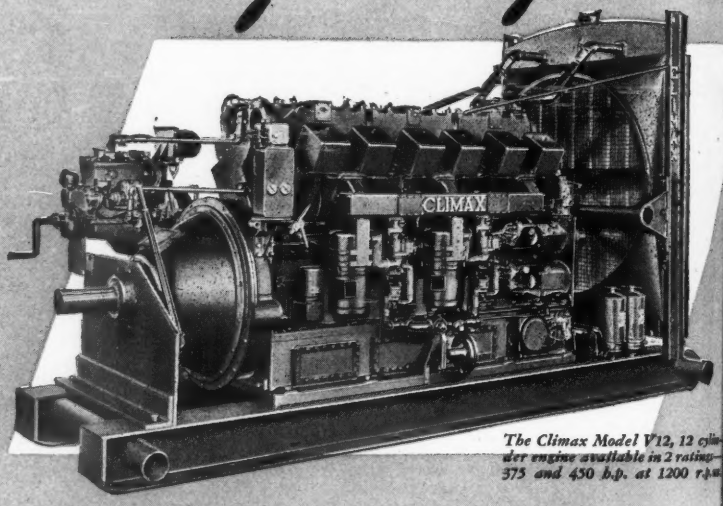
Climax BUILT-IN Gasoline Starting Engine



Power for instant starting of your Climax drilling engine is supplied by a small gasoline engine built into the larger unit. This modern accepted method ends electric starting failures due to weak or run-down battery or other trouble, and provides a quick, powerful turnover in all weathers and climates.

Operation is simple and unfailing. The small engine is mounted on the drilling unit in the manner shown. It is equipped with a clutch and a Bendix drive which turns over the drilling engine. As soon as the big engine starts, the clutch is disengaged and the auxiliary engine shut down.

Climax drilling units are successful because they are engineered for the job. All design features and equipment which field conditions indicate as necessary have been incorporated into these engines.



The Climax Model V12, 12 cylinder engine available in 2 ratings—375 and 450 h.p. at 1200 r.p.m.

Among these are:
DUAL CARBURETION • BLUE STREAK COMBUSTION • DUAL SPARK PLUGS • DUAL MAGNETOS • TRIPLE FUEL EQUIPMENT • POWER TAKE-OFF AND SUPPORT • STEEL SKID MOUNTING

TAKE CARE ...of your present Climax Engines

1. Keep engine lubricants clean, and maintain oil at proper level. Change oil after each 100 hours of operation.
2. Keep cooling system free of scale, to prevent warpage of cylinder blocks and damage to heads. Clean and flush cooling system with scale remover every three months.
3. Maintain tappet clearances at those shown on engine nameplate. Check every two weeks with thickness gauge.
4. Keep fuel clean.
5. Keep outside surface of engine clean and dry to prevent ignition harness failures.

Climax Engineering Company
GENERAL OFFICES & FACTORY:
Clinton, Iowa
REGIONAL OFFICES: **Chicago, Ill., Dallas, Texas**

"For High Achievement in the Production of War Material"

Distributed in the Mid-Continent by
The Continental Supply Company
General Offices: **Dallas, Texas**

Distributed in the California Oil Field by
Climax Engines & Parts Co.
1400 S. Grand Avenue, **Los Angeles, California**

Union Spuds Outpost

Approximately ½ mile northeast of the northerly producing limits of the East Cat Canyon field the Union Oil Co. is drilling McNee No. 1. Located near the south ¼ corner of section 20-9n-32w, the hole is currently spot coring ahead in hard shale with streaks of gray sand below 2500 ft. The well is classed as a core hole and will probably not be drilled below 3000 ft. No information is being released on the section penetrated.

Gato Ridge Completion

The O. C. Field Gasoline Corp. Texas Fee No. 2, has been recompleted on the pump for an initial production of 75 barrels per day of 13 gravity oil showing a gross cut of 35%. After producing for several days the gross fluid had decreased to where the well was only showing a net oil recovery of 26 barrels per day with the cut still at 35%. Located on the westerly flank of the field in section 4-9n-32w, the well was originally completed from the upper Monterey Chert zone for an initial production of 27 barrels per day of clean 14 gravity oil. At this time 464 ft. of zone was open between the depths of 2322 ft. and 2786 ft. The 5¾ inch liner was pulled from the old total depth of 2792 ft. and the hole deepened to 4015 ft. A 5¾ inch liner, including 714 ft. perforated was landed at 4011 ft. and cemented through perforations at 3297 ft. The perforations were washed with distillate before placing well on production.

Shell Extends Ventura Avenue

The Shell Oil Co. is again planning to extend the producing limits of the Ventura Avenue field. Locations for five additional wells have been staked. Taylor No. 188, located near the center of the structure will be drilled to the deep D-7 zone while Nos'. 189, 190, and 191 will be D-5 zone wells at the extreme west end of the field and Taylor No. 192 will be an outpost well on the northerly flank of the field.

El Segundo Test Completed

The Pauley Brothers El Segundo test, Loftus No. 1, has been placed on the pump and is currently producing an estimated 40 barrels per day of gross fluid showing a cut of 70%. The gravity of the oil being produced is reported to be running between 14 and 15 degrees. Located east of the sand dunes northwest of the town of El Segundo, the hole was directionally drilled to the west under the Los Angeles City sewer farm and although the well is located on city owned property the operator has refused to give out any information on either the geological or the mechanical condition of the hole. The meager information gleaned from unofficial sources is that the total depth is about 7300 ft., with an 80 ft. drill pipe fish left on bottom. A string of seven inch casing was cemented over the conglomerate oil zone at 7170 ft. and a 5½ inch perforated liner landed on top of the drill pipe fish.

ON YOUR CALLS FOR FISHING TOOLS

YOU can shorten the time between a fish in the hole and a fish on the floor by giving Bowen a ring — **day or night.**

Bowen not only has the stocks of tools ... the experienced service men . . . the delivery facilities . . . **but also has FIVE strategically located service stores throughout active California fields.** All these stores are open 24 hours a day for your convenience, ready with fast, accurate fishing tool service to **any** California well!

So **call Bowen** next time there's a job for a fishing tool. Service is being maintained at peak efficiency to help you with your wartime oil production—wherever you operate!

BOWEN FISHING TOOL CO.
SANTA FE SPRINGS, CALIFORNIA
VENTURA · BAKERSFIELD · AVENAL · SANTA MARIA
CASPER, WYOMING

H&B

WAR DOES NOT PREVENT US FROM PROVIDING WILSON PARTS & SERVICE.

INSIST ON OUR TRAINED MECHANICS WHEN YOU REPAIR YOUR WILSON EQUIPMENT.

LOWER OPERATING COSTS WHEN YOUR WILSON EQUIPMENT IS PROPERLY REPAIRED.

SERVICE PROVIDED QUICKLY & EFFICIENTLY ON WILSON AND OTHER EQUIPMENT.

OIL FOR THE WAR IS BEING PRODUCED WITH WILSON RIGS AND PRODUCTION HOISTS.

NO JOB TOO TOUGH FOR WILSON RIGS & HOISTS.

H&B SALES CO.
2875 CHERRY AVE., LONG BEACH, CALIF.
TELEPHONE LONG BEACH 416-59

San Joaquin Valley

Superior Testing Cymric Outpost

Approximately one mile northwest of the Cymric field the Superior Oil Co. has set casing and is preparing to make a production test in its F. & W. No. 1. Located in the southwest ¼ of section 23-29s-21e, the well has been bottomed in oil sand and shale at the total depth of 1516 ft. A combination string of casing was run and cemented thru perforations over the top of the oil sand. The operator has refused to release any definite information on the well other than the depth. Approximately 1½ miles to the northwest, the operator is coring Weston No. 1, below 3000 ft. The location of this well is reported as, 815 ft. north and 518 ft. east from the center of section 22-29s-21e.

Continental Spuds McClung "Cat"

North of its recently discovered McClung field the Continental Oil Co. has spudded in Easton No. 2. The hole is currently being drilled in sand and shale below 7100 ft. Located in section 33-29s-26e, the well is being drilled as an extension test in an area which is noted for a number of one and two well fields. Notable among these are the Canfield Ranch and the East Strand fields. Approximately three miles northeast of this well, in section 14-29s-26e, the Western Gulf Oil Co. is drilling below 6500 ft. in KCL No. A-37-14. Located midway between the Greeley and Fruitvale fields, the well will test the Vedder sand which is expected between 8000 ft. and 9000 ft.

Tejon Field Completion

The Richfield Oil Corp. Tejon No. A-78-35, has been completed on the pump for an initial production of 108 barrels per day of 18 gravity oil cutting six per cent water and mud. This well has shown more kick than any well drilled in the field to date. While rigging up the pumping unit the well flowed by heads for several days at an average rate of 50 barrels per day showing a gross cut of 10 percent, with the tubing pressure heading from 0 to 15 pounds and casing pressure from 400 to 765 pounds. Located in section 35-11n-19w, southeast of the discovery well, the hole was bottomed in shale at the total depth of 2250 ft. A 6⅝-inch perforated liner was landed on bottom after cementing an 8⅝-inch water string at 1882 ft. East of this well in section 36, the operator has spudded Tejon No. A-18-36 and is drilling ahead below 1100 ft. through 13⅜-inch surface pipe cemented at 199 ft. The outcome of this well will be watched with considerable interest as the structure seems to be rising in this direction. Approximately six miles north of this well, in section 6-11n-18w, the company is drilling Tejon B-23-6, below 2900 ft. This well is about one mile north of the recently abandoned Tejon B-65-7, which was bottomed in gray sand at the total depth of 2304 ft. after finding the top of the Chanac oil zone at 2017 ft.

SAN JOAQUIN VALLEY WILDCATS

Area	Well	No.	Section	Depth	Status
	Fresno County				
Cantua	Standard Oil Co., Well	88-3	3, 17-14	4812	Drilling
Coalinga	The Texas Co., S. P.	58-21	21, 19-16	9474	Sidetracking
Kerman	Seaboard Oil Corp., S. T.	1-28	28, 14-17	6475	Abandoned
Lanare	Amerada Pet. Corp., Sample	F-22-15	15, 17-18	760	Drilling
Polvadero	Standard Oil Co., Bourdieu	1A	1, 21-16	10868	Testing
Raisin City	Herndon, Sam, Well		13, 15-18		Location
	The Texas Co., San Joaquin	1	11, 15-17	5024	Drilling
	Kern County				
Antelope	Etienne Lang, Occidental	6-NW-30	30, 26-19	1342	Prep. to pump
	Etienne Lang, Occidental	7-NW-30	30, 26-19	1282	Drilling
Bowerbank	The Texas Co., Bowerbank Unit II	8B	8, 29-24	4949	Redrilling
Devils Den	Priest & DeKalb, Blake	1	25, 25-18	1050	Testing
Edison	Seaboard Oil Co., Garrison-Davis	2	30, 29-29	2359	Abandoned
	Wilshire Oil Co., Cardoza	1	7, 30-29	4200	Drilling
Edison, SE	Judy K Oil Co., El Tejon	1	22, 30-30	2700	Idle
Fruitvale	The Texas Co., KCL	1	26, 29-27	3363	Reaming
Grapevine	Kern Line Oil Co., Well	1	19, 11-19	9391	Idle
	M. Metzenbaum, Well	34-3	34, 11-19	99	Drilling
	KCL Co., Cont. Oil Co.	J-1	17, 30-27		Rig
Gosford	T. W. A. Oil Co., KCL	44-22	22, 30-26		Grade
Jasmine	Western Gulf Oil Co., Quinn	1	8, 25-27	3566	Abandoned
Kern Front	Independent Expl. Co., Austin	1	28, 28-29	3002	Testing
Kern River	J. T. Wilcox, Zanetti	1	17, 28-28	3497	Drilling
McClung	Continental Oil Co., Easton	2	33, 29-26	7107	Drilling
McKittrick	Superior Oil Co., F. & W.	1	23, 29-21	1516	Completing
	C.C.M.O. Co., Well	G-2	20, 32-23	2525	Drilling
Midway	Std. Oil Co., Ethel D. S.	1	36, 12-24	4835	Drilling
Mt. Poso	Trico Oil & Gas Co., Glide	1-11	11, 27-28		Location
Mt. View	DiGiorgio Fruit Corp., Well	35-10	10, 31-29		Location
	T. W. A. O. Co., Porter	24-18	18, 30-29		Rigging up
Poso Creek	Butler Bros. Oil Co., Butler	2	14, 27-27		Location
	Grandell Oil Co., Newhope	3	11, 27-27		Rig
Pyramid Hills	Pac. O. & G. Dev. Corp., C.C.&M.O.	3	17, 24-18	650	Drilling
Richgrove	Lomi Oil Corp., Burnell	1	34, 24-27		Location
Rio Bravo	Richfield Oil Corp., KCL-Goosloo	1	20, 29-25	2365	Drilling
	Union Oil Co., Kerneo	88-8	8, 29-25	10488	Drilling
Rosedale	Western Gulf Oil Co., KCL-A	37-14	14, 29-26	6460	Drilling
Round Mt.	Bandini Pet. Corp., Signal Mills	5A	24, 28-28	2548	Prep. to pump
	Bandini Pet. Corp., Signal Mills	6	24, 28-28	600	Drilling
	Gen. Pet. Corp., Railroad	4	23, 28-28	2613	Pumping
	The Texas Co., KCL	1-13	13, 28-28		Location
	Wilshire Oil Co., Hartfield	1	32, 28-29	2609	Abandoned
Shafter	T.W.A. Oil Co., Shafter Comm.	86-7	7, 28-25	11680	Fishing D.P.
So. Belridge	Bandini Pet. Co., Bacon	1	27, 28-20		Rig
Strand	Superior Oil Co., Houghton	36-35	35, 29-26	7014	Drilling
Stockdale	W.G.O. Co., KCL	77-5	5, 30-27		Rigging up
Tejon	Richfield Oil Corp., Tejon	B-23-6	6, 11-18	2961	Fishing
	Richfield Oil Corp., Tejon	B-14-36	36, 11-19	2314	Abandoned
	Richfield Oil Corp., Tejon	A-18-36	36, 11n-19w	1054	Drilling
Temblor	B. F. Delanty, Well	69-A-1A	36, 29-20	316	Drilling
10 Section	Ohio Oil Co., KCL	J-1	6, 31-26	9075	Drilling
	Madera County				
Herminghaus	The Texas Co., Gill	41-17	17, 13-16		Location
Firebaugh	The Texas Co., Moffat	55-7	7, 12-15		Rig
	Merced County				
Dos Palos	Obispo & Brookshire Oil Co's Stone	1	1, 12-11	970	Drilling
	Tulare County				
Reedley	Amerada Pet. Corp., Comm.	2-11	23, 15-23		Location
	Amerada Pet. Corp., Comm.	5-1	25, 15-23	815	Abandoned

Buena Vista Hills Miocene Discovery

The Standard Oil Co. has completed its Buena Vista Hills upper Miocene discovery well No. 54-27B. For the first four hours after being turned into the tanks the well flowed at an initial rate of 624 barrels per day of 30.7 gravity oil cutting 1.4% mud through a 20/64-inch bean with 400 pounds flow pressure. The gas rate was gauged at 238 MCF per day. The well is currently flowing 223 barrels per day through a 12/64-inch bean with 475 pounds flow pressure and 88 MCF of gas. Located near the south ¼ corner of section 27-31s-23e, the well was drilled and cored to a total depth of 4460 ft. after testing two bodies of oil sand found in the upper Miocene formation between the depths of 4273 ft. and 4435 ft. The hole was plugged to 4365 ft. and a string of 6⅝-inch casing cemented at 4360 ft. The plug was then cleaned out to 4440 ft. and a 4¾-inch liner including 78 ft. perforated landed at 4438 ft. A string of 2½-inch tubing was hung at 3405 ft. with a packer at 3257 ft. The completion of this well is expected to start a boom of no mean proportions in this area. In addition to Standard, companies holding acreage in the area are Tide Water Assoc. Oil Co., Murvale Oil Co., Honolulu Oil Corp., Richfield Oil Corp, and the North American Oil Cons.

Independent Expl. Co. Testing

Northwest of the Premier field the Independent Exploration Co. Austin No. 1, is gun perforating and testing by stages. Located in section 28-28s-27e, the well was drilled and cored to a total depth of 3002 ft. after finding the top of the Chanac zone at 2559 ft. The hole was plugged to 2648 ft. and a combination string of seven-inch casing including 22 ft. perforated landed at 2648 ft. and cemented through perforations at 2621 ft. Prior to drilling out the cement at 2621 ft. the seven-inch casing was gun perforated from 2539 ft. to 2546 ft. A bailing test of this zone recovered water with a trace of oil and 70 sacks of cement was squeezed away through these perforations. The operator is now making a water shut off test at 2571 ft. before making additional production tests.

Merced County Gets New Test

In the Dos Palos area of Merced county the Obispo and Brookshire Oil Cos. are drilling Stone No. 1. Located in section 1-12s-11e, the well is currently being drilled in sand and shale below 1000 ft. The location of this well falls just north of the abandoned San Joaquin Oil Co. well which was drilled to a total depth of 5024 ft. and abandoned in 1936. The operators intend to take a look at the sands in both the Eocene and Cretaceous formations.

Ten Section "Cat" Running High

Midway between the South Coles Levee and the Ten Section fields the Ohio Oil Co. KCL No. J-1, is drilling ahead in Cherty shale below 9100 ft. Tentative correlations made from the electric log show the well to be running approximately 200 ft. higher structurally than the Richfield Oil Corp. well which was drilled in this area. Located near the center of section 6-31s-26e, this well should encounter the top of the Stevens zone within the next few hundred feet.

Kerman "Cat" Abandoned

The Seaboard Oil Corp. S.T. No. 1-28 was abandoned at a total depth of 6475 ft. Located in section 28-14s-17e, northwest of the Raisin City field, the well found only gray sand in the Eocene and Cretaceous formations. The top of the Cretaceous was found at 6330 ft.

FOR SALE

CLARK DRILLING ENGINES—"V" belt, or flat belt drive, complete with clutch and reverse gear. Fitted with butane, natural gas or gasoline carburetors. Can be inspected at Rambler Lease, Kern River Oil Field. Phone Bakersfield 66441, ask for Holtz, or Bakersfield 21549, ask for H .O. Wammock, or write 703 Taft Building, Hollywood 28, California. 3-5b

WELL DRILLING WANTED

OWNER of 160 acres in Los Angeles Basin surrounded within 2 miles or more by good producing oil wells wants person of means to do development for customary share production. Geologist has pronounced land oil bearing. Box 84, c/o California Oil World, 117 W. 9th St., L. A. 15 . 4/5d

WAX?
SCALE?
SLUDGE?

NOBS SOLVENTS will thoroughly and quickly remove these trouble makers from tank bottoms, flow lines, wells, heat exchangers, etc.

For many years NOBS has specialized in the development of Solvents, Water Treatments, Cleaning Compounds, for the oil producer and refiner.

NOBS CHEMICAL COMPANY
2465 East 53rd Street
Kimball 9288
LOS ANGELES 11, CALIFORNIA

BUY
WAR
BONDS

AUTO MOTELS FOR SALE

AUTO MOTELS in So. Calif. provide a profitable business and a home. Some are for sale, priced from $25,000 to $100,000. Gross income runs 25% to 30% of price. For details write Frank Dykema, 1762 Westwood Blvd., Los Angeles 24, Calif. 4/5d

modernized
WATER WITCH SERVICE
in oil wells
serving California fields

OILFIELDS SERVICE CO.
R. D. Elliott, Manager
529 Roosevelt Rd. Long Beach — Ph. Long Beach 42096

Coastal and Northern Districts

Eureka "Cat" Coring

In Humboldt county, south of the town of Eureka, the British American Oil Producing Co. is coring ahead in Mitchell-Dorr No. 1 Located in section 10-3n-1w, the well is currently being spot cored in lower Pliocene shale below 2200 ft. The objective depth of the well is approximately 6000 ft. which should be sufficient to test the gas sand now being produced by The Texas Co. in the Tompkins Hill gas field which lies about one mile south of the Mitchell-Dorr well.

Honolulu-Barnsdall Drills Solano County

Northwest of the Lodi-Galt gas fields the Honolulu Oil Corp. and the Barnsdall Oil Co., have combined forces and are drilling Liberty Farms No. 1. Located 200 ft. south and 1150 ft. west from the northeast corner of section 18-5n-5e, the well is currently drilling ahead in shale and sand below 1000 ft. The objective of the well is the Capay sand now being produced by the Amerada Pet. Corp. in its Hausken Comm. No. 1.

Corning Test Makes Showing

North of the town of Corning the Richfield Oil Corp. Gallatin No. 1 in section 26-25n-3w, is preparing to make a formation test, with the hole bottomed at 2793 ft. A drilling break was noted at 2963 ft. and the well tried to blow out. The mud was changed and the hole cored ahead to the present bottom. Core recovery was reported as being predominately gas sand with a few streaks of shale.

Standard Testing

In the Suisun Bay area of Solano county the Standard Oil Co. is testing Honker Comm. No. 1A. Located in section 25-3n-1w, the well was drilled and cored to a total depth of 8304 ft. Drill pipe was lost at that depth and the hole was redrilled to 7492 ft. Seven-inch casing was cemented at 6812 ft. and a 4¾-inch liner cemented on bottom at 7485 ft. A formation test was made of gun perforations between the depths of 7200 ft. and 7399 ft. which resulted in a blow of dry gas that was gauged at various rates from three to five million cubic feet. Testing operations still continue. South of this well, and in the same section, the operators A. O. Stewart No. 1, has been abandoned. The hole was originally drilled to a total depth of 8728 ft. where the drill pipe stuck and could not be recovered. The hole was redrilled to approximately 6000 ft. and again junked. All attempts to recover the fish failed and the hole was abandoned. It is reported that another well will be drilled in the area in the very near future.

Fillmore "Cat" Getting Deep

Northwest of the town of Fillmore the Standard Oil Co. is spot coring ahead below 13,150 ft. in Fillmore Comm. No. 2-1. Located in section 24-4n-20w. the hole is now deeper than any ever drilled in the coastal district. The company is withholding all information on the well other than depth. A protective string of seven-inch casing has been cemented at 10,728 ft.

Outpost Coring

The Los Nietos Co. Scott No. 2, outpost well in the Arroyo Grande area of San Luis Obispo county is abandoning at 3239 ft. after finding the objective Pismo sands too tight to produce. Equipment is moving to Lowther No. 1, also in section 5-32s-13e. Approximately two miles to the east in section 3, location has been staked for a lower Pliocene test which will be known at Beckett No. 1. Northwest of these wells, in section 31-31s-13e, Wm. C. McDuffie is currently pumping 52 barrels per day of 13 gravity oil from Dollie No. 2. Sands in the Pismo formation are being produced in this well between the depths of 885 ft. and 1287 ft. This operator is also drilling Dollie No. 1, below 500 ft. on section 5-32s-13e.

COASTAL COUNTIES WILDCATS

Area	Well	No.	Section	Depth	Status
	Santa Barbara County				
Cat Canyon	Richfield Oil Corp., Los Flores	1	10, 8-33		Foundation
E. Cat Canyon	Union Oil Co., McNee, C. H.	1	20, 9-32	2480	Drilling
Lompoc	S. R. Williams, Fickert	1	8, 7-33	3107	Drilling
Los Alamos	J. I. Anderson & Co., So. Calif. Pet. Corp., Archambeault	1	3, 7-32	1550	Drilling
	Ventura County				
Camarillo	Camarillo Oil Co., Camarillo	2	32, 2-20	2647	Testing
	Jos. Schuck, Schuck	1	28, 2-20	1102	Idle
Fillmore	Standard O. Co., Fillmore Comm.	2-1	24, 4-20	13132	Drilling
Oxnard	Exeter Oil Co., Ltd., Lennox	2	6, 1-21	2812	Bldg. storage
	Hub City Pet. Co., Chase	1	6, 1-21	2351	Coring
Piru	Delroy Pet. Corp., Lisk	3	22, 5-18	2808	Prep. to deep'n
	Standard Oil Co., Bowman	2-1	14, 4-18	1600	Drilling
Santa Paula	J. J. Stevens, Corehole	1	31, 4-20	2969	Cleaning out
Sespe	Volunteer Pet. Co., Tar Creek	3	28, 5-19	2098	Reaming
Shiells Canyon	Los Nietos Co., Elkins	2-2	5, 3-19		Location
South Mt.	F. E. Fairfield, S. M.	1	19, 3-20	4991	Rigging pump
	Wilshire Oil Co., Petit	1	9, 3-20	1285	Drilling
Timber Canyon	Geo. H. Roberts, O'Leary	1	29, 4-20	380	Idle

NORTHERN COUNTIES WILDCATS

County	Well	No.	Section	Depth	Status
Butte	Richfield Oil Corp., Dayton	2-1	6, 21n-1e	3123	Drilling
Humboldt	Br.Am.O.Prod.Co., Mitchell-Dorr	1	10, 3n-1w	2200	Drilling
San Joaquin	Richfield Oil Corp., East Stockton	2	6, 1n-9e	3018	Drilling
San Luis Obispo	Los Nietos Co., Scott	2	5, 32s-13e	2339	Abandoning
	Los Nietos Co., Lowther	1	5, 32s-13e		Rigging up
	McDuffie, Wm. C., Dollie	2	31, 31s-13e	1287	Pumping
	McDuffie, Wm. C., Dollie	1	5, 32s-13e	468	Drilling
Solano	Honolulu-Barnsdall O. Co's., Liberty Farms	1	18, 5n-5e	760	Drilling
	Standard Oil Co., Honker Comm.	1A	25, 3n-1w	8304	Testing
	Standard Oil Co., A. O. Stewart	1	25, 3n-1w	8728	Abandoned
Tehama	Richfield Oil Corp., Gallatin	1	26, 25n-3w	2793	Drilling
Yolo	Superior Oil Co., Oeste	1	10, 8n-1e	3846	Drilling

Standard Plugs Huntington Test

East of the town, in the surf area of the Huntington Beach field, the Standard Oil Co. Surf No. 2-1, has been plugged back preparatory to placing the well on production from an upper streak of the main zone. The hole was drilled and cored to a total depth of 8516 ft. and bottomed in shale of Lower Puente age. A bridge was placed in the hole from 4500 ft. to 4405 ft. and a combination string of 6⅝ inch casing, including 51 perforated landed at 4402 ft. and cemented through perforations at 4347 ft. The well is now being bailed preparatory to placing well on production. As yet insufficient fluid has been removed from the hole to permit an estimate to be made of the commercial possibilities of the well. In the town lot portion of the field the Standard's proposed 50 well Tar zone program has no doubt been considerably dampened by the showing made by the first two wells completed. Huntington A No. 60, is pumping 8 barrels per day of 14 gravity oil from the perforated interval of 1921 ft. to 2108 ft and Huntington B No. 79, is pumping 34 barrels per day from two perforated intervals between the depths of 1728 ft. and 1951 ft.

BUY WAR BONDS

BUDA POWER

GAS--GASOLINE--DIESEL--BUTANE

•

SERVICE-SALES

•

PRODUCTION EQUIPMENT COMPANY

651 East Gage Ave.

Los Angeles, California ADams 5148

Investigate NIKELADIUM*

STEEL CASTINGS

For Your

POST-WAR PRODUCT IMPROVEMENT PLANS

Two months *before* Pearl Harbor, we were in full swing on war production. Our products now go to shipyards from Coast to Coast.

Specialized experience, trained personnel and rigid standards of quality enabled us to switch quickly from peace-time production to quality war-time production.

When peace returns, it will not be difficult for us to resume production on your cast steel requirements.

In making *your* plans for post-war product improvement, select the product of a foundry whose personnel has a consistent record for quality production.

**Not just steel, but a standard of quality.*

LOS ANGELES STEEL CASTING COMPANY

2444 So. Alameda St. • Los Angeles, California

SOLD THROUGH DEALERS ONLY • SEND FOR COMPLETE STOCK LIST

IN California UNION OIL INSTALLS A MODEL DEHYDRATION PLANT

Many operators are familiar with production problems in the Santa Maria, California, area, where operating techniques must be highly efficient to properly dehydrate the heavier, more viscous crudes. In this area, Petreco Electric Dehydrators are being utilized very effectively by the Union Oil Company.

Petreco Dehydrating, while efficiently treating crudes over a wide range of gravity, was virtually "raised" on heavy oil. Now, with the heavy oils in constant demand, Petreco Electric Dehydrating is worth keeping in mind.

. . . USING THE PETRECO PROCESS

COMPLETE OIL STATE COVERAGE WITH PETRECO PROCESS

Resident field engineers are located in refining and producing centers wherever Petreco processes are in use. These men are specialists, and are always available to assure maximum operating efficiency, and to give helpful advice and assistance on any problem of dehydration or desalting.

PETRECO

DEHYDRATING DESALTING

PETROLEUM RECTIFYING COMPANY

5121 So. Wayside Dr., Houston 1, Texas
648 Edison Building, Toledo 4, Ohio
530 West Sixth Street, Los Angeles 14, Calif.

Representatives in principal production and refining centers